DRAFT

Compliance Test Report for Furnace # 1 and Furnace # 2 at the Arecibo Facility

Prepared for:
The Battery Recycling Company Inc.
Arecibo, Puerto Rico

Prepared by:
URS Corporation
Oak Ridge, Tennessee

URS

September 2012

COMPLIANCE TEST REPORT
FOR FURNACE #1 AND FURNACE # 2
AT THE ARECIBO FACILITY

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1093 Commerce Park Drive, Suite 100
Oak Ridge, Tennessee 37830

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FOR FURNACE # 1 AND FURNACE # 2
AT THE ARECIBO FACILITY

For:
BATTERY RECYCLING COMPANY, INC.

CERTIFICATION SHEET

Having reviewed the test program described in this report, I hereby certify the data, information, and results in this report to be accurate and true according to the methods and procedures used.

URS Corporation

Michael Mowery
Source Testing Manager

PROFESSIONAL ENGINEERING CERTIFICATION

Having reviewed this report, I herby certify the contents of this report to be accurate and complete.

_____
PE

PE Certification Date: _____

State of Certification: _____

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List of Acronyms

BRC	Battery Recycling Company
CFR	Code of Federal Regulations
CO_2	Carbon Dioxide
dscfm	Dry Standard Cubic Feet per Minute
EQB	Puerto Rico Environmental Quality Board
USEPA	U.S. Environmental Protection Agency
MACT	Maximum Achievable Control Technology
NESHAPS	National Emission Standards for Hazardous Air Pollutants
O_2	Oxygen
QA	Quality Assurance
QC	Quality Control
scf	standard cubic foot
scm	standard cubic meter
URS	URS Corporation

1.0 Introduction

The Battery Recycling Company, Inc. (BRC) owns and operates a lead recycling facility in Arecibo, Puerto Rico. BRC's operations are subject to the compliance requirements established in 40 CFR Part 63, Subpart X (National Emission Standards for Hazardous Air Pollutants from Secondary Lead Smelting, "Secondary Lead Smelting MACT Standard"), the Subpart L, Standards of Performance for Secondary Lead Smelters and a construction permit issued by the Puerto Rico EQB. URS Corporation (URS) was contracted by BRC to conduct compliance particulate matter (PM) and Lead testing on their two rotary furnaces, and face velocity measurements on the Lead and Slag Taps/Molds. The compliance testing was conducted during the week of July 30, 2012. The testing was observed by USEPA, PREQB, and EPA CEPD repersenatives. The observation team consisted of Francisco Claudio- EPA CEPD, Kai Tang – EPA Region 2 New Jersey, Richard Kan – EPA Region 2 New York, and Weldin Ortiz – PREQB.

The compliance testing allowed BRC to achieve four compliance objectives. The first two objectives were to determine if the facility is in compliance with the 0.022 grains/dry standard cubic foot (gr/dscf) PM requirement, and the <20% opacity requirement, as set forth in the NESHAPS Standard Requirement 40 CFR 60.122(a). The third objective was to verify that the face velocity of the emission control hoods on the lead taps/molds and slag tap/molds were >300 feet per minute (fpm), as required in the MACT Standard 40 CFR 63.544. The fourth objective was to measure the Inorganic Lead emissions from the facility to confirm compliance with the inorganic lead emission limit of .00087 grains of inorganic lead per dry standard cubic foot for both furnaces at the facility. This test report presents the results of these test objectives along with the test data and description of the procedures used to collect the data.

Section 2.0 describes the methods and techniques that were used to conduct the compliance testing. Section 3.0 is a discussion of the compliance test results for the stack. Section 4.0 discusses the quality assurance (QA) and quality control (QC) procedures that were followed in the performance of the testing. Appendix A contains the compliance test calculation data for the

stack. Appendix B contains the field data sheets. Appendix C contains the process data. Appendix D contains field equipment calibration data used in the compliance test. Appendix E contains the laboratory results.

2.0 Test Conditions and Technical Approach

The following sections describe the methods and techniques that were used to complete the compliance testing on Furnace # 1 and Furnace # 2.

2.1 Test Conditions and Schedule

During the week of July 30, 2012 URS performed; three 120 minute test runs for particulate matter and inorganic lead on the inlet ducts to the Furnace # 1 and Furnace # 2 baghouses and three 60 minute tests to determine Opacity on the main baghouse stack. Face velocity measurements were taken within the plane of the furnace hoods and to each kettle. The testing was performed during periods of charging and tapping only, which was determined by USEPA to be the worst case scenario that would be the most challenging for the control devices. As required by EPA, each test run was broken into segments based on charging and tapping activities. A segment of the test run would start at the beginning of an activity and the test would be stopped at the next available traverse point after the conclusion of an activity or for a predetermined time as set by USEPA. This sequence of sampling was repeated until all the test points were completed, this was designated as a single test run.

2.2 Sample Locations

The two sampling locations for the PM and lead sampling were the two baghouse inlet ducts. Both inlet ducts were 58.0 inches in diameter. Samples and velocity measurements were collected by accessing two test ports at each location. The ports were located approximately 10 ft (2.06 diameters) downstream and 10 ft (2.06 diameters) upstream of the nearest duct transition or flow disturbance. Flow measurements were performed using a 24-point traverse using two ports (12 points per port). A pretest Cyclonic flow check was performed prior to the Method 5/12 sampling and did not show any significant cyclonic flow at any traverse point across either duct. The average cyclonic flow on Furnace # 1 was 3.23 degrees and 4.58 degrees on Furnace # 2. Appendix B contains the reference method field data sheets for the stack sampling location.

2.3 Technical Approach

The methodologies that were utilized for data collection are presented and summarized in Table 2-1. The sampling procedures included in the technical approach were selected to accurately determine the properties and composition of the stack's gas stream. The selected methodologies were consistent with those recommended and referenced in Title 40 of the Code of Federal Regulations Part 60 (40 CFR Part 60), Appendix A, and 40 CFR Part 63, Subpart X.

Table 2-1

Reference Method Test Procedures

Source	Pollutant	Reference Procedures for Performance Test
Inlet Duct for Furnace # 1 and Furnace # 2	Particulate Matter	EPA Title 40 CFR Part 60, Appendix A, Method 5, Determination of Particulate Matter Emissions from Stationary Sources
	Inorganic Lead	EPA Title 40 CFR Part 60, Appendix A, Methods 1 and 2, Determination of Stack Gas Volumetric Flow Rate
		EPA Title 40 CFR Part 60, Appendix A, Method 3A, Gas Analysis for Determination of Dry Molecular Weight
		EPA Title 40 CFR Part 60, Appendix A, Method 4, Determination of Moisture Content in Stack Gases
		EPA Title 40 CFR Part 60, Appendix A, Method 12, Determination of Inorganic Lead Emissions from Stationary Sources
Main Stack	Opacity	EPA Title 40 CFR Part 60, Appendix A, Method 9, Determination of Opacity Emissions from Stationary Sources

The following are summary descriptions of the sampling methodologies that were followed to complete the sampling program.

2.3.1 EPA Methods 1 and 2, Determination of Stack Gas Volumetric Flow Rate

U.S. Environmental Protection Agency (EPA) Methods 1 and 2 were used to determine the stack gas volumetric flow rate at the sampling location. An integrated velocity traverse was conducted during each 2-hour PM test run for each of the inlet ducts at each traverse point. An S-type pitot tube and an incline manometer were used to measure the velocity pressure. A calibrated type "K" thermocouple was used to measure the stack gas temperature at each traverse point. For each test

run, the pitot tube and thermocouple were positioned sequentially at each of the appropriate traverse points. Temperature and velocity pressure (ΔP) readings were observed and recorded. Utilizing the stack gas molecular weight and moisture content, the standard (Q_{std}) and actual volumetric flow rates were calculated in accordance with the formulas found in EPA Reference Method 2. The flow rate data has been included in Appendices A and B.

2.3.2 EPA Method 3A, Determination of Stack Gas Molecular Weight

In accordance with USEPA Method 3, the stack gas O_2 and CO_2 concentrations were determined for each inlet duct. For each of the test runs, a stack gas grab sample was directly analyzed for O_2 and CO_2 content using a Fyrite analyzer. The resulting O_2 and CO_2 concentrations were used to calculate the molecular weight of the stack gas.

2.3.3 EPA Method 4, Determination of Stack Gas Moisture Content

The moisture content (%), B_{wo}, of the stack gas was determined for each inlet duct in accordance with EPA Method 4. An exhaust gas sample was drawn from the stack and passed through chilled glass impingers. The moisture content of the stack gas was determined for the compliance runs by measuring the weight gain of the chilled impingers over the length of the test run. The moisture determination was integrated into the Method 5 /12 sampling results.

2.3.4 EPA Method 5, Determination of Stack Gas Particulate Matter Emissions

The filterable particulate matter testing was performed in accordance to EPA Method 5. Sampling was performed by extracting a sample of the baghouse exhaust gas stream through a stainless steel button-hook nozzle attached to a glass-lined, heat-traced, probe. The probe was attached to a heated glass filter holder containing a pre-weighed glass-fiber filter. The probe and filter heater box were maintained at a temperature of $248^oF \pm 25^oF$. After leaving the filter holder, the gas stream sample passed through a short unheated Teflon sample line into a series of four glass impingers. The first impinger was a Smith-Greenburg filled with 100 ml of 0.1 N

Nitric Acid. The second impinger was a modified Smith-Greenburg and filled with 100 ml of 0.1 N Nitric acid. The third impinger was a modified Smith-Greenburg and was initially empty. The fourth impinger was a modified Smith-Greenburg containing approximately 200 grams of indicating silica gel. The impingers were weighed prior to assembling the sampling train to permit gravimetric moisture determination. After exiting the impingers, the exhaust gas sample traveled through an umbilical cord to the control console and was then exhausted to atmosphere. The control console contained the sample pump, dry gas meter, calibrated orifice meter, and heat controls for the probe and filter box.

At the conclusion of each test run, the sample train was recovered by washing the sample probe and nozzle three times with 0.1 N nitric acid into a sample container. The filter was removed from the filter holder and placed into a Petri dish and sealed for transport. The front half of the glass filter holder and connecting elbow were washed with 0.1 N nitric acid into the probe wash sample container. A sample of the 0.1 N nitric acid used in the sample recovery was collected and analyzed as a reagent blank. The impinger train was then disassembled and each impinger was weighed to determine the moisture gained during the sample run. After weighing the impingers, the first three impingers were emptied into a container. Each impinger and connecting glassware was rinsed with 0.1 N nitric acid and collected, this was added to the sample container for the specific sample container for each run, each separate container for each test run was then labeled. At the conclusion of sampling, all the samples were packaged and returned to the URS facility for subsequent PM analysis and shipment to the laboratory for lead analysis.

The particulate samples were analyzed by URS personnel. The analysis was performed by placing the filters into a desicator for a minimum of 24 hours. The filters were then weighed to a constant weight. The 0.1 N nitric acid probe rinses and reagent blank were transferred to pre-weighed cups and allowed to dry in a laboratory hood at ambient temperature. The sample cups were then transferred to a desicator and allowed to dry for a minimum of 24 hours. The cups were then weighed to a constant weight. The combined weights of the filter and probe wash were used to calculate the mass emission rate of solid particulates. After obtaining the final particulate weights, the dried residue in the cups were reconstituted with 0.1 N nitric acid and sent to the lab

along with the filters and impinger solutions for determination of the inorganic lead concentrations. The data collected during the PM sampling is contained in Appendix B.

2.3.5 EPA Method 12, Determination of Stack Gas Inorganic Lead Emissions

The inorganic lead emission rate was determined in accordance with EPA Reference Method 12 for the outlet ducts. A total of three test runs were performed. The Method 12 sampling was incorporated into the Method 5 sampling train by replacing the water in the impingers with 0.1 N nitric acid. An exhaust gas sample was isokinetically drawn from the stack through a stainless steel nozzle attached to a heated glass lined sampling probe. The exhaust gas sample was then passed through a heated glass-fiber filter and into a set of chilled glass impingers. The impingers were connected to the control console by means of an umbilical cord. The control console contained the sampling pump, sample rate controller, test temperature controls and sample rate dry gas meter. The data collected during the lead sampling is contained in Appendix B.

2.3.6 EPA Method 9 Determination of Stack Gas Opacity Emissions

VE readings from the stack exhaust were performed by a certified VE reader using the following procedures.

Observer's Position

The VE observer stood at a distance of at least one stack height away and with the sun oriented within the required 140^{o} arc behind his back. Consistent with maintaining the above requirement, the observer made his observations from a position such that his line of vision was approximately perpendicular to the plume direction.

Field Records

The observer recorded the name of the plant, emission location, facility type, observer's name and affiliation, and the date on a field data sheet. The time, estimated distance to the emission location, approximate wind direction, estimated wind speed, description of the sky condition (presence and

color of clouds), and plume background were recorded on the field data sheet at the time opacity readings were initiated and completed.

Observations

Opacity observations were made at the exit of the baghouse stack. The observer did not look continuously at the stack exit but instead observed the stack exit momentarily at 15-second intervals.

Recording Observations

Opacity observations were recorded to the nearest 5 percent at 15-second intervals on the observational record sheet. A minimum of 240 observations were recorded. Each test period took 60 minutes to complete. Each momentary observation recorded was deemed to be representative of the average opacity of emissions for a 15-second period.

Data Reduction

Opacity was determined by averaging the 240 consecutive observations recorded at 15-second intervals for each test run.

2.3.7 Determination of Hood Face Velocities using a Propeller Anemometer

The face velocities at the hood opening to the rotary furnace and at the opening to each kettle operating during the testing period were measured using a propeller anemometer. The face velocities were measured with the doors open in a manner comparable to normal operating conditions. The measurements were conducted at multiple points around the door openings. The face velocity values listed in the result table consist of the average number observed during each check of the respective source. The results are listed in Table 2-2.

Table 2-2
Face Velocity Results

Source	Face Velocity	Comments
Kettle # 1	520 ft/min	
Kettle # 2	320 ft/min	
Kettle # 3	354 ft/min	
Kettle # 4	356 ft/min	
Kettle # 5	335 ft/min	
Kettle # 6	376 ft/min	
Kettle # 7	276 ft/min	
Kettle # 8	370 ft/min	
Kettle # 9	300 ft/min	
Furnace # 1	438 / 250 ft/min	Four doors closed / two doors closed
Furnace # 2	540 / 266 ft/min	Four doors closed / two doors closed
Ingot Machine	205 ft/min	
Slag Enclosure	351 ft/min	

3.0 Performance Testing Emission Results

The following is a brief summary and discussion of the Main Baghouse stack compliance testing results.

The compliance test results for the particulate matter runs are summarized in Table 3-1 for Furnace # 1 and Table 3-2 for Furnace # 2. The average particulate matter emission rate, for the compliance test was 0.0039 grains/dscf for Furnace # 1 and 0.0052 grains/dscf for Furnace # 2. BRC's Furnace # 1 and Furnace # 2 test results indicate that the source complies with the performance standard of 0.022 grains/dscf as stated in the Subpart L, Standards of Performance for Secondary Lead Smelters. The results for the compliance tests for Visible Emissions averaged 0.0% showing compliance with the less than 20% standard in the NSPS for Lead Smelters. The results for the Inorganic Lead runs averaged 0.000016 grains/dscf for Furnace # 1 and 0.000016 for Furnace # 2 this shows compliance with the inorganic lead emission limit of .00087 grains/dscf as stated in the Secondary Lead Smelting MACT Standard.

Table 3-1
Furnace # 1 Stack Test Results

Parameters	Run # 1	Run # 2	Run # 3	Average
Sample Date	7/31/2012	8/1/2012	8/2/2012	
Run Times	14:03-20:06	12:36-20:03	11:01-19:23	
Sample Time	120	120	120	
Vol. Sampled @ STP (ft3)	75.685	66.270	72.768	71.574
Moisture Content (% Vol.)	4.4	4.8	4.5	4.5
O2 (%)	20.0	20.0	20.0	20.0
CO2 (%)	1.0	1.0	1.0	1.0
Stack Gas Temperature (^{o}F)	178.8	177.9	179.3	179.0
Gas Flow Rate (DSCFM)	28,174	24,723	27,598	26,832
Percent Isokinetic	99.6	99.4	97.7	98.9
Particulate Matter Conc. (Grains/DSCF)	0.0019	0.0056	0.0041	0.0039
Particulate Matter Mass Rate (lbs/hr)	0.453	1.184	0.978	0.872
Inorganic Lead Conc. (Grains/DSCF)	0.000017	0.000022	0.000008	0.000016
Inorganic Lead Mass Rate (lbs/hr)	0.0041	0.0048	0.0020	0.0036

Table 3-2
Furnace # 2 Stack Test Results

Parameters	Run # 1	Run # 2	Run # 3	Average
Sample Date	7/31/2012	8/1/2012	8/2/2012	
Run Times	13:16-21:34	8:19-18:22	9:47-18:10	
Sample Time	120	120	120	
Vol. Sampled @ STP (ft3)	79.640	80.326	75.730	78.565
Moisture Content (% Vol.)	4.4	4.8	5.0	4.7
O2 (%)	20.0	20.0	20.0	20.0
CO2 (%)	1.0	1.0	1.0	1.0
Stack Gas Temperature (^{o}F)	178.5	175.4	177.9	177.0
Gas Flow Rate (DSCFM)	34,237	34,863	34,487	34,529
Percent Isokinetic	104.3	103.3	98.5	102.1
Particulate Matter Conc. (Grains/DSCF)	0.0064	0.0043	0.0049	0.0052
Particulate Matter Mass Rate (lbs/hr)	14.720	9.934	11.283	11.979
Inorganic Lead Conc. (Grains/DSCF)	0.000018	0.000018	0.000012	0.000016
Inorganic Lead Mass Rate (lbs/hr)	0.0053	0.0053	0.0035	0.0047

4.0 Quality Assurance/Quality Control Procedure

The objective of the URS's QA Program is to ensure the accuracy and precision, as well as reliability, of the data collected and generated for URS's clients and to meet the data quality objectives of regulatory or accrediting bodies. Management, administrative, statistical, investigative, preventative, and corrective techniques were employed to maximize the reliability of data.

During the compliance testing, a strict QA/QC program was adhered to. Before actual sampling on-site, all the sampling equipment was thoroughly checked to ensure that each component was clean and operable. Any damaged or faulty equipment was tagged and removed from service until it could be repaired. If any corrective actions were taken in response to these QC checks or in response to supervisor review of QC procedures, the corrective action taken was documented in a field QA/QC logbook.

Proper equipment calibration is essential in maintaining the desired data quality level. All calibrations of the equipment used in the stack sampling portion of the testing conformed to the guidelines outlined in the EPA quality assurance handbook, *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods* (EPA-600/4-77-027a). The following sections give a synopsis of the calibration procedures for the main components of the stack sampling systems.

4.1 Dry Gas Meters/Orifice Meters

The dry gas meter and critical orifice in each control box used during the testing were calibrated before the test in order to ensure accurate measurements of the sample gas volumes. The dry gas meter and critical orifice are normally housed as a set inside each control box and were calibrated as such. The control box was calibrated against a secondary calibration standard dry gas meter.

The dry gas meter/critical orifice sets were calibrated at predetermined nominal volume flow settings. For each of these flow rates, an accuracy ratio factor to the calibration standard (Y_i) was

computed for the individual dry gas meters. A successful calibration for a particular dry gas meter would be achieved if each value of Y_i was within 2 percent of the average value of Y_i (Y_i = Y ±0.02Y).

In order to establish calibration for the critical orifice, a calibration coefficient ($\Delta H@_I$) was calculated for each flow rate. This coefficient is the orifice pressure differential (in inches H_2O) at a distinct orifice manometer setting that gives a flow of 0.75 ft^3/min of air at standard conditions. The desired tolerance for this coefficient is ±0.2 of the average value of the four values of $\Delta H@_I$ ($\Delta H@$ ±0.2). If any of the pre-test calibration coefficients for a particular meter violates the acceptance criteria, the meter in question would be adjusted and recalibrated. A copy of the control box calibrations are provided in Appendix D.

4.2 Thermocouples and Thermocouple Readouts

All thermocouples used during the stack sampling tests were calibrated to ensure accurate temperature measurements. All of the sensors utilized were type "K" thermocouples, which have a working range of approximately -300 °F to approximately 2500 °F. These sensors were used in the measurement of stack gas temperature, probe sheath temperature, filter box temperature, and impinger temperature. The thermocouples were calibrated against an NITS traceable mercury-in-glass thermometer at predetermined temperatures. In order to obtain the calibration data from each sensor, a single, recently calibrated thermocouple readout was used.

The thermocouple readouts used during the testing were calibrated using a thermocouple simulator. This calibration apparatus generates a voltage signal that mimics the signal an ideal "K" type thermocouple would exhibit at a particular temperature. The signal can be changed via a slide switch. The readouts were calibrated at ten different points from 200 °F through 2000 °F, at increments of 200 °F. A copy of the thermocouple and readout calibrations are provided in Appendix D.

4.3 Barometer

The field barometer used during the test was a digital type barometer. This barometer was calibrated by comparing it to a standard mercury column barometer and adjusting it if any deviation existed between it and the standard. This exercise was performed both before and after the testing activities.

4.4 Analytical Balance

The balance used in the field to measure impinger weights was checked with calibration weights prior to use.

The analytical balance used to weigh the particulate samples was calibrated with certified weights prior to weighing the test samples.

4.5 Pitot Tubes

The S-type pitot tubes used for the isokinetic sampling were calibrated in a wind tunnel against a standard pitot, which is considered a reference source. The basis for the calibration is described in 40 CFR, Part 60, Appendix A, Method 2. A copy of the pitot calibrations are provided in Appendix D.

Appendix A

USEPA Approval Letter

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
2890 WOODBRIDGE AVENUE
EDISON, NEW JERSEY 08837-3679

JUL 27 2012

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Luis Figueroa
President
Battery Recycling Company, Inc.
P.O. Box 1016
Arecibo, Puerto Rico 00613-1016

Re: Battery Recycling Company Stack Test Protocol

Dear Mr. Figueroa:

The United States Environmental Protection Agency (EPA) has reviewed Battery Recycling Company, Inc.'s (BRC's) stack test protocol, *Particulate, Lead and Visible Emissions Sampling Protocol - Furnace #1 and Furnace #2 Exhaust Ducts* (Protocol), Revision 4, dated July 24, 2012. The Protocol is conditionally approved for use in BRC's stack test that is scheduled for July 31 to August 2, 2012. EPA's approval of the Protocol is subject to the following conditions:

1. The revised protocol still erroneously cites testing on, of, or at the combined baghouse stack (see pages 5, 6, and 10 for instance). All emissions sampling for particulate matter and lead compounds shall be at the alternate sampling location, as indicated in the Protocol, on the respective baghouse exhaust ducts.

2. BRC shall maintain its routine daily operations conducted at each baghouse whereby a cleaning cycle is manually activated at each cell to verify that the system is working properly. BRC states in its document, *Answer to EPA regarding test protocol.pdf*, which was submitted to the EPA on July 17, 2012, that:

   > "As part of the routine daily operations BRC take[s] readings of the differential pressure values on each of the baghouse cell compartments. Every morning an employee will record the differential pressure values on each cell in both baghouses for a total of 16 readings. In addition a cleaning cycle is manually activated at each cell to verify [that] the system is working properly."

3. BRC shall also include in the Source Test Report documentation of all baghouse cell cleaning operations, manually activated or otherwise, during the week of the stack test.

4. One test run shall be conducted per batch process. The minimum sampling time for emissions sampling at the respective exhaust duct shall be 120 minutes for each run. The sampling regimen shall be as follows:

    a. BRC shall conduct emissions sampling predominately during periods of furnace charging or tapping operations.

    b. The duration of emissions sampling at each of 24 traverse points shall be five minutes.

    c. Emissions sampling shall be conducted throughout all three phases of charging operations per batch process. If a charging operation ends prior to the end of emissions sampling at a particular traverse point, the emissions sampling at that traverse point may continue until the end of its five-minute period.

    d. If the tapping operation for that batch process ends prior to the end of emissions sampling at a particular traverse point, the emissions sampling at that traverse point may continue until the end of its five-minute period. Emissions sampling may continue, if necessary, for the few remaining traverse points after the end of the tapping operation such that all traverse points are sampled.

5. BRC shall conduct visible emission observations only during periods of furnace charging or tapping operations.

6. BRC shall provide EPA a time schedule of all production activities and stack testing activities at least one day in advance of each day of stack testing.

If you have any questions concerning this letter, please call Héctor Vélez or Francisco Claudio of EPA's Caribbean Environmental Protection Division at 787-977-5850 or 787-977-5841, respectively. Any specific questions concerning stack testing should be addressed to Kai Tang of my staff at 732-321-4364.

Sincerely,

John S. Kushwara, Chief
Monitoring and Assessment Branch

cc: Ing. Luis Sierra Torres, Director
Air Quality Area
Puerto Rico Environmental Quality Board
P.O. Box 11488
Santurce, PR 00910

Furnace # 1

TBRC Sampling Period

Furnace 1

Run #1

Date 7/31/2012

From	To	Time (min)	Stage	Charge ID
14:03	14:28	25	2nd Charge	F1/Jul/2012/#88
15:43	16:18	35	3rd Charge	F1/Jul/2012/#88
19:06	20:06	60	Tap	F1/Jul/2012/#88
Total Sampling Time		120		

Run #2

Date 8/1/2012

From	To	Time (min)	Stage	Charge ID
12:36	13:36	60	1st Charge	F1/Aug/2012/#2
14:55	15:25	30	2nd Charge	F1/Aug/2012/#2
19:33	20:03	30	Tap	F1/Aug/2012/#2
Total Sampling Time		120		

Run #3

Date 8/2/2012

From	To	Time (min)	Stage	Charge ID
11:01	11:31	30	3rd Charge	F1/Aug/2012/#4
14:58	15:28	30	Tap	F1/Aug/2012/#4
18:23	19:23	60	2nd Charge	F1/Aug/2012/#5
Total Sampling Time		120		

Carga de Óxido en Horno No.1

Carga	Turno	Supervisor	Fecha
86	2-10	I. Soto	30-Jul-12

Datos de Carga Anterior

Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección Requerida (√)
Charola	18"	8hrs 20 Min	( ) Si ( ) No

Material para Carga

Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)
Óxido	32,000	32,061
Plomo	8,000	8,038
Polvo de Filtro	2	2
Hierro	3,000	1000 + 1,000 + 500*
Carbón	2,400	2,874
Soda	3,300 + 470	3,300 + 470
Mezcla Pesada por:	J. Rosado	**Num.Loader:**

Flujo de Aceite

Flama baja SP.	150 ± 10
Valor Real	150
Flama Media SP.	220 ± 10
Valor Real	220
Flama Alta SP.	260 ± 10
Valor Real	256

Acompañamiento de la Carga

Acción	Flama	Tiempo Patrón	Tiempo Programado Inicial	Tiempo Programado Final	Tiempo Real Inicial	Tiempo Real Final	Turno
1er Cargamento	Baja	20 min.	6:50	7:10	6:50	7:30	□A □B ☑C □D
Fundir	Media	1 Hr.	7:10	8:10	7:30	8:30	□A □B ☑C □D
2do Cargamento	Baja	20 min.	8:10	8:30	8:50	9:30	□A □B ☑C □D
Fundir	Media	1 Hr.	8:30	9:30	9:30	10:30	□A ☑B □C □D
3er Cargamento	Baja	20 min.	9:30	9:50	10:30	11:50	□A ☑B □C □D
Fundir	Alta	2.15 Hr.	9:50	12:05	11:50	1:30 2:50	□A ☑B □C □D
Descarga	Baja	45 min.	12:05	12:50	2:50	3:40	□A ☑B □C □D
Tiempo Total			6.00 Hr.		8hrs 50mins		

Olla #1		Pulgadas Iniciales	Pulgadas Finales	Conos de Escoria	Charola	Cono
Carga #				Cantidad	√	W/ Fm
Carga #	#86	55" Susla	37" Susla			
Carga #	W/ Fm	W/ Fm	W/ Fm	Conos de Plomo	Olla □2 □3 □4 □5 □ n/a	
Carga #	W/ Fm	W/ Fm	W/ Fm	Pulgadas de Plomo Olla #1	18"	

Características del Producto (√)

Escoria en el Horno	( ) No	(√) Si, cantidad = 6"	
Escoria	( ) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(√) Normal
Ladrillos	( ) Limpio	(√) Sucio	

Limpieza del Horno (√)

Cajón de Plomo	(√) Limpio ( ) Sucio
Canal	(√) Limpio ( ) Sucio
Boca del Horno	(√) Limpio ( ) Sucio
Realizado por:	O. Ogalo

Responsabilidad de Operador						Responsabilidad de Supervisor		
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
30-Jul-12	☐ Am ☑ Pm 2:45	☐ 621 D ☐ 521 D ☑ 621 E	3590	☐ Si ☑ No = -70	J. Rosado		☐ 6-2 ☑ 2-10 ☐ 10-6	#86
Rango de Tolerancia de los loaders 621D y 521D 3580 a 3740lbs								

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	□A □B ☑C □D	2-10	Israel Soto		30-Jul-12
Supervisor	□A □B □C □D	10-6	Luis Marrero		30-Jul-12
Supervisor	□A □B □C □D	W/ Fm	W/ Fm	W/ Fm	W/ Fm
Supervisor	□A □B □C □D	W/ Fm	W/ Fm	W/ Fm	W/ Fm

Supervisor de Producción:		**Fecha:**	31/Jul/12
Supervisión de Calidad:		**Fecha:**	

* No se añade el restante de Hierro Fm

Battery Recycling Co.

Carga de Óxido en Horno No.1

No. Carga	Turno	Supervisor	Fecha
#87	10-6	Luis Marrero	31-Jul-12

Datos de Carga Anterior			
Escoria	**Plomo (Pulg.)**	**Tiempo de Corrida**	**Corrección Requerida (√)**
Charola	18"	8hrs 50 min	(√) Si ( ) No

Material para Carga			
Materiales	**Peso Patrón(Lbs.)**	**Peso Medido (Lbs.)**	
Óxido	30,000	30,094	
Plomo	8,000	8,016	
Polvo de Filtro	2	2	
Hierro	3,200	1,600+1,000+564	
Carbón	3,000	3,011	
Soda	3,300	3,300	
Mezcla Pesada por:	O. Ojeda	**Num.Loader:**	621-E

Flujo de Aceite	
Flama baja SP.	150 ± 10
Valor Real	150
Flama Media SP.	220 ± 10
Valor Real	223
Flama Alta SP.	260 ± 10
Valor Real	257

Acompañamiento de la Carga							
Acción	**Flama**	**Tiempo Patrón**	**Tiempo Programado**		**Tiempo Real**		**Turno**
			Inicial	**Final**	**Inicial**	**Final**	
1er Cargamento	Baja	20 min.	3:40	4:00	3:40	4:00	□A ☑B □C □D
Fundir	Media	1 Hr.	4:00	5:00	4:00	5:00	□A ☑B □C □D
2do Cargamento	Baja	20 min.	5:00	5:20	5:00	5:20	□A ☑B □C □D
Fundir	Media	1 Hr.	5:20	6:20	5:20	6:2a	□A □B □C □D
3er Cargamento	Baja	20 min.	6:20	6:40	6:2a	6:5a	□A □B □C □D
Fundir	Alta	2.15 Hr.	6:40	8:55	6:5a	11:1a	□A □B □C □D
Descarga	Baja	45 min.	8:55	9:40	11:1a	12:00	□A □B □C □D
Tiempo Total			6.00 Hr. 8 hr 20 min +				

Olla #1		Pulgadas		Conos de Escoria	Charola	Cono
		Iniciales	**Finales**			
Carga #	4	37"	20"	**Cantidad**	✓	2 4
Carga #						
Carga #				**Conos de Plomo**	**Olla** □2 □3 □4 □5 ☑n/a	
Carga #				**Pulgadas de Plomo Olla #1**	17	

Características del Producto (√)			
Escoria en el Horno	( ) No	(√) Si, cantidad = 7 "	
Escoria	(√) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(√) Normal
Ladrillos	(√) Limpio	( ) Sucio	

Limpieza del Horno (√)	
Cajón de Plomo	(√) Limpio ( ) Sucio
Canal	(√) Limpio ( ) Sucio
Boca del Horno	(√) Limpio ( ) Sucio
Realizado por:	Edwin Santana

Responsabilidad de Operador						Responsabilidad de Supervisor		
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
31-Jul-12	☑ Am ☐ Pm 12:50	☐ 621 D ☐ 521 D ☑ 621 E	3,659	☑ Si ☐ No = -2	O. Ojeda		☐ 6-2 ☐ 2-10 ☑ 10-6	87
Rango de Tolerancia de los loaders 621D y 521D: 3580 a 3740lbs								

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	□A ☑B □C □D	10-6	Luis Marrero		31-Jul-12
Supervisor	□A □B □C ☑D	6-2	Juan G Reyes	Juan G	7.31.12
Supervisor	□A □B □C □D				
Supervisor	□A □B □C □D				

Supervisor de Producción:		**Fecha:**	2/ago/12
Supervisión de Calidad:		**Fecha:**	

* Flujo de aceite Manual pendiente

Carga de Óxido en Horno No.1

No. Carga	Turno	Supervisor	Fecha
~~F~~88	6-2	Juan G Perez	7-31-12

Datos de Carga Anterior

Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección Requerida (√)
Charola	17"	8 hr 20 mnt	( ) Si (✓) No

Material para Carga

Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)
Óxido	72,000	72,160
Plomo	8,000	8,024
Polvo de Filtro	2-	2-
Hierro	1,200	1,000+1,000=11,000
Carbón	1,000	1,041
Soda	1,300	1,300
Mezcla Pesada por:	Juanes d'haro	**Num.Loader:** 621E

Flujo de Aceite

Flama baja SP.	150 ± 10
Valor Real	150
Flama Media SP.	220 ± 10
Valor Real	220
Flama Alta SP.	260 ± 10
Valor Real	261

Acompañamiento de la Carga

Acción	Flama	Tiempo Patrón	Tiempo Programado Inicial	Tiempo Programado Final	Tiempo Real Inicial	Tiempo Real Final	Turno
1er Cargamento	Baja	20 min.	12:00	12:20	12:00	12:30	□A □B □C ~~□D~~
Fundir	Media	1 Hr.	12:20	1:20	12:30	1:30	□A □B □C ~~□D~~
2do Cargamento	Baja	20 min.	1:20	1:40	1:30	2:40	~~□A~~ □B □C □D
Fundir	Media	1 Hr.	1:40	2:40	2:40	3:40	~~□A~~ □B □C □D
3er Cargamento	Baja	20 min.	2:40	3:00	3:40	4:40	~~□A~~ □B □C □D
Fundir	Alta	2.15 Hr.	3:00	5:15	4:40	7:00	~~□A~~ □B □C □D
Descarga	Baja	45 min.	5:15	6:00	7:00	8:00	□A □B □C □D
Tiempo Total			6.00 Hr.		8 hrs		

Olla #1		Pulgadas Iniciales	Pulgadas Finales
Carga #	~~F~~88	20"	3/50"
Carga #			
Carga #			
Carga #			

Conos de Escoria	Charola	Cono
Cantidad	✓	1/1

Conos de Plomo	Olla □2 □3 □4 □5 □ n/a
Pulgadas de Plomo Olla #1	17

Características del Producto (√)

Escoria en el Horno	( ) No	(✓) Si, cantidad = 17	
Escoria	(✓) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(✓) Normal
Ladrillos	( ) Limpio	(✓) Sucio	

Limpieza del Horno (√)

Cajón de Plomo	(✓) Limpio ( ) Sucio
Canal	(✓) Limpio ( ) Sucio
Boca del Horno	(✓) Limpio ( ) Sucio
Realizado por:	Nata

Responsabilidad de Operador						Responsabilidad de Supervisor		
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
7-31-12	☒ Am ☐ Pm 8:40	☐ 621 D ☐ 521 D ☒ ~~621~~ E	3,679	☐ Si ☒ No = +19	Juanes d'haro	Juan G	☒ 6-2 ☐ 2-10 ☐ 10-6	~~F~~88

Rango de Tolerancia de los loaders 621D y 521D 3580 a 3740lbs

Supervisores	Turno	Hora	Nombre:	Firma	Fecha
Supervisor	□A □B □C ~~□D~~	6-2	Juan G Perez	Juan G	7-31-12
Supervisor	~~□A~~ □B □C □D	2-10	Edison Gonzalez	E.G.	7/31/12
Supervisor	□A □B □C □D			N	
Supervisor	□A □B □C □D			A	

Supervisor de Producción:		**Fecha:**	2/ago/12
Supervisión de Calidad:		**Fecha:**	

Battery Recycling Co.

Carga de Óxido en Horno No.1

No. Carga	Turno	Supervisor	Fecha
#89	2-10	Edison Gonzalez	7/31/12

Datos de Carga Anterior			
Escoria	**Plomo (Pulg.)**	**Tiempo de Corrida**	**Corrección Requerida (√)**
Charola	17	8hrs	(√) Si ( ) No

Material para Carga			
Materiales	**Peso Patrón(Lbs.)**	**Peso Medido (Lbs.)**	
Óxido	32,000	32081	
Plomo	8,000	8,029	
Polvo de Filtro	2	2	
Hierro	3,000	1000+500+500+500	
Carbón	2,900	2,936	
Soda	3,300	3,300	
Mezcla Pesada por:	Juan	**Num.Loader:**	621

Flujo de Aceite	
Flama baja SP.	150 ± 10
Valor Real	151
Flama Media SP.	220 ± 10
Valor Real	241
Flama Alta SP.	260 ± 10
Valor Real	261

Acompañamiento de la Carga							
Acción	**Flama**	**Tiempo Patrón**	**Tiempo Programado**		**Tiempo Real**		**Turno**
			Inicial	**Final**	**Inicial**	**Final**	
1er Cargamento	Baja	20 min.	8:00	8:20	8:00	9:00	☒A ☐B ☐C ☐D
Fundir	Media	1 Hr.	8:20	9:20	9:00	10:00	☒A ☐B ☐C ☐D
2do Cargamento	Baja	20 min.	9:20	9:40	10:00	11:00	☐A ☒B ☐C ☐D
Fundir	Media	1 Hr.	9:40	10:40	11:00	12:00	☐A ☒B ☐C ☐D
3er Cargamento	Baja	20 min.	10:40	11:00	12:00	1:00	☐A ☒B ☐C ☐D
Fundir	Alta	2.15 Hr.	11:00	1:15	1:00	3:00	☐A ☒B ☐C ☐D
Descarga	Baja	45 min.	1:15	2:00	3:00	4:00	☐A ☒B ☐C ☐D
Tiempo Total			6.00 Hr.		8hrs		

Olla #1		Pulgadas		Conos de Escoria	Charola	Cono
		Iniciales	**Finales**			
Carga #				**Cantidad**	√	√ pr
Carga #	#89	10" sucia 17" Lim	0"			
Carga #	N/A Jm	N/A Jm	N/A Jm	**Conos de Plomo**	Olla ☐2 ☐3 ☐4 ☐5 ☐ n/a	
Carga #				**Pulgadas de Plomo Olla #1**	19"	

Características del Producto (√)			
Escoria en el Horno	( ) No	( ) Si, cantidad = 7"	
Escoria	( ) Liquida	(√) Espesa	( ) Gruesa
Color del Humo	(√) Negra Falta Hierro	( ) Blanca Falta Carbón	( ) Normal
Ladrillos	( ) Limpio	(√) Sucio	

Limpieza del Horno (√)	
Cajón de Plomo	(√) Limpio ( ) Sucio
Canal	(√) Limpio ( ) Sucio
Boca del Horno	(√) Limpio ( ) Sucio
Realizado por:	O. Ogalde

Responsabilidad de Operador						Responsabilidad de Supervisor		
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
7/31/12	☒ Am ☐ Pm 5:3	☐ 621 D ☐ 521 D ☐ 621 E	3,671	☐ Si ☒ No = +11	Juan	E.G.	☐ 6-2 ☒ 2-10 ☐ 10-6	# 89
Rango de Tolerancia de los loaders 621D y 521D: 3580 a 3740lbs								

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	☒A ☐B ☐C ☐D	2-10	Edison Gonzalez	E.G.	7/31/12
Supervisor	☐A ☐B ☐C ☐D	10-6	Luis Marrero		31-jul-12
Supervisor	☐A ☐B ☐C ☐D	N/A Jm	N/A Jm	N/A Jm	N/A Jm
Supervisor	☐A ☐B ☐C ☐D				

Supervisor de Producción:		**Fecha:**	2/ago/12
Supervisión de Calidad:		**Fecha:**	

Carga de Óxido en Horno No.1

No. Carga	Turno	Supervisor	Fecha
#1	10–6	Luis Marrero	1-Ago-12

Datos de Carga Anterior			
Escoria	**Plomo (Pulg.)**	**Tiempo de Corrida**	**Corrección Requerida (√)**
Charola	19"	8 hrs	(✓) Si ( ) No

Material para Carga			
Materiales	**Peso Patrón(Lbs.)**	**Peso Medido (Lbs.)**	
Óxido	32,000	32,101	
Plomo	8,000	8,042	
Polvo de Filtro	2	2	
Hierro	3,000	1,300+1,200+500	
Carbón	2,900	2,889	
Soda	3,300	3,300	
Mezcla Pesada por:	A. Ruiz	**Num.Loader:**	621-E

Flujo de Aceite	
Flama baja SP.	150 ± 10
Valor Real	151
Flama Media SP.	220 ± 10
Valor Real	220
Flama Alta SP.	260 ± 10
Valor Real	262

Acompañamiento de la Carga							
Acción	**Flama**	**Tiempo Patrón**	**Tiempo Programado**		**Tiempo Real**		**Turno**
			Inicial	**Final**	**Inicial**	**Final**	
1er Cargamento	Baja	20 min.	4:00	4:20	4:00	5:00	☐A ☑B ☐C ☐D
Fundir	Media	1 Hr.	4:20	5:20	5:00	6:00	☐A ☑B ☐C ☐D
2do Cargamento	Baja	20 min.	5:20	5:40	6:00	7:30	☐A ☐B ☐C ☐D
Fundir	Media	1 Hr.	5:40	6:40	7:30	8:30	☐A ☐B ☐C ☐D
3er Cargamento	Baja	20 min.	6:40	7:00	8:30	9:20	☐A ☐B ☐C ☐D
Fundir	Alta	2.15 Hr.	7:00	9:15	9:20	11:40	☐A ☐B ☐C ☐D
Descarga	Baja	45 min.	9:15	10:00	11:40	12:40	☐A ☐B ☐C ☐D
Tiempo Total			6.00 Hr. 8 hr total				

Olla #1		Pulgadas Iniciales	Pulgadas Finales	Conos de Escoria	Charola	Cono
Carga #	#1	0"	0"	Cantidad	—	4
Carga #	#2	60"	48"			
Carga #		—		Conos de Plomo	Olla ☐2 ☐3 ☐4 ☐5 ☐ n/a	
Carga #				Pulgadas de Plomo Olla #1	18"20 12 en olla #1 y 1 Cono	

Características del Producto (√)			
Escoria en el Horno	( ) No	(✓) Si, cantidad = 8"	
Escoria	(✓) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(✓) Normal
Ladrillos	(✓) Limpio	( ) Sucio	

Limpieza del Horno (√)	
Cajón de Plomo	(✓) Limpio ( ) Sucio
Canal	(✓) Limpio ( ) Sucio
Boca del Horno	(✓) Limpio ( ) Sucio
Realizado por:	Adminsantana

Responsabilidad de Operador						Responsabilidad de Supervisor		
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma	Verificado Visualmente Firma:	Turno	No. Carga
1-Ago-12	☑ Am ☐ Pm 2:00	☐ 621 D ☐ 521 D ☑ 621 E	6659	☑ Si ☐ No = -1	A. Ruiz		☐ 6-2 ☐ 2-10 ☑ 10-6	#1
Rango de Tolerancia de los loaders 621D y 521D: 3580 a 3740lbs								

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	☐A ☑B ☐C ☐D	10-6	Luis Marrero		1-Ago-12
Supervisor	☐A ☐B ☐C ☑D	6-2	Juan C Perez	Juan G	1-8-12
Supervisor	☐A ☐B ☐C ☐D				
Supervisor	☐A ☐B ☐C ☐D				

Supervisor de Producción:		**Fecha:**	2/ago/12
Supervisión de Calidad:		**Fecha:**	

* Presión de aceite Manual

Carga de Óxido en Horno No.1

No. Carga	Turno	Supervisor	Fecha
# 2	6-2	Juan G Perez	8-1-12

Datos de Carga Anterior			
Escoria	**Plomo (Pulg.)**	**Tiempo de Corrida**	**Corrección Requerida (√)**
Charola	18"	8 hr 40 mnt	( ) Si ( ) ~~No~~

Material para Carga			
Materiales	**Peso Patrón(Lbs.)**	**Peso Medido (Lbs.)**	
Óxido	32,000	32,018	
Plomo	8,000	8,014	
Polvo de Filtro	2.	2.	
Hierro	3,000	1,100 + 1000 + 900	
Carbón	2,900	2,924	
Soda	3,300	3,300	
Mezcla Pesada por:	Juan & Pinaza	**Num.Loader:**	621E

Flujo de Aceite	
Flama baja SP.	150 ± 10
Valor Real	150
Flama Media SP.	220 ± 10
Valor Real	220
Flama Alta SP.	260 ± 10
Valor Real	261

Acompañamiento de la Carga							
Acción	**Flama**	**Tiempo Patrón**	**Tiempo Programado**		**Tiempo Real**		**Turno**
			Inicial	**Final**	**Inicial**	**Final**	
1er Cargamento	Baja	20 min.	12:40	1:00	12:40	1:~~25~~40	☐A ☐B ☐C ☐~~D~~
Fundir	Media	1 Hr.	1:00	2:00	1:40	2:40	☐A ☐B ☐C ☐~~D~~
2do Cargamento	Baja	20 min.	2:00	2:20	2:40	3:40	☑~~A~~ ☐B ☐C ☐D
Fundir	Media	1 Hr.	2:20	3:20	3:40	4:40	☑~~A~~ ☐B ☐C ☐D
3er Cargamento	Baja	20 min.	3:20	3:40	4:40	5:30	☑~~A~~ ☐B ☐C ☐D
Fundir	Alta	2.15 Hr.	3:40	5:55	5:30	7:40	☑~~A~~ ☐B ☐C ☐D
Descarga	Baja	45 min.	5:55	6:40	7:40	8:40	☑~~A~~ ☐B ☐C ☐D
Tiempo Total			6.00 Hr.		8 hrs		

Olla #1		Pulgadas	
		Iniciales	**Finales**
Carga #	#2	48"	27
Carga #			
Carga #	N/A	N/A	N/A
Carga #			

Conos de Escoria	Charola	Cono
Cantidad	✓	N/A

Conos de Plomo	Olla ☐2 ☐3 ☐4 ☐5 ☐ n/a
Pulgadas de Plomo Olla #1	27

Características del Producto (√)			
Escoria en el Horno	( ) No	(✓) Si, cantidad = 27	
Escoria	(✓) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(✓) Normal
Ladrillos	( ) Limpio	(✓) Sucio	

Limpieza del Horno (√)	
Cajón de Plomo	(✓) Limpio ( ) Sucio
Canal	(✓) Limpio ( ) Sucio
Boca del Horno	(✓) Limpio ( ) Sucio
Realizado por:	Noyal

Responsabilidad de Operador						Responsabilidad de Supervisor		
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
8-1-12	☑~~Am~~ ☐ Pm 9:30	☐621 D ☐521 D ☑~~621~~ E	3,674	☐ Si ☑~~No~~ = +14	Juan & Pinaza	Juan G	☑6-2 ☐ 2-10 ☐ 10-6	# 2
Rango de Tolerancia de los loaders 621D y 521D 3580 a 3740lbs								

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	☐A ☐B ☐C ☑~~D~~	6-2	Juan G Perez	Juan G	8-1-12
Supervisor	☑~~A~~ ☐B ☐C ☐D	2-10	Edison Gonzalez	E.G.	8/1/12
Supervisor	☐A ☐B ☐C ☐D	N/A	N/A	N/A	N/A
Supervisor	☐A ☐B ☐C ☐D				

Supervisor de Producción:		**Fecha:**	2/ago/12
Supervisión de Calidad:		**Fecha:**	

Carga de Óxido en Horno No.1

No. Carga	Turno	Supervisor	Fecha
#3	2-10	Edison Gonzalez	8/1/12

Datos de Carga Anterior			
Escoria	**Plomo (Pulg.)**	**Tiempo de Corrida**	**Corrección Requerida (√)**
Charola	"17	8 hrs	( ) Si (✓) No

Material para Carga			
Materiales	**Peso Patrón(Lbs.)**	**Peso Medido (Lbs.)**	
Óxido	32,000	32,079	
Plomo	8,000	8,051	
Polvo de Filtro	2	2	
Hierro	3,000	1,500+200+1,300	
Carbón	2,900	2,882	
Soda	3,300	3,300	
Mezcla Pesada por:	Juan	**Num.Loader:**	621-E

Flujo de Aceite	
Flama baja SP.	150 ± 10
Valor Real	152
Flama Media SP.	220 ± 10
Valor Real	242
Flama Alta SP.	260 ± 10
Valor Real	261

Acompañamiento de la Carga							
Acción	**Flama**	**Tiempo Patrón**	**Tiempo Programado**		**Tiempo Real**		**Turno**
			Inicial	**Final**	**Inicial**	**Final**	
1er Cargamento	Baja	20 min.	8:40	9:00	8:40	9:40	☒A ☐B ☐C ☐D
Fundir	Media	1 Hr.	9:00	10:00	9:40	10:40	☒A ☐B ☐C ☐D
2do Cargamento	Baja	20 min.	10:00	10:20	10:40	11:40	☐A ☒B ☐C ☐D
Fundir	Media	1 Hr.	10:20	11:20	11:40	12:40	☐A ☒B ☐C ☐D
3er Cargamento	Baja	20 min.	11:20	11:40	12:40	1:40	☐A ☒B ☐C ☐D
Fundir	Alta	2.15 Hr.	11:40	11:55	1:40	6:00	☐A ☒B ☐C ☐D
Descarga	Baja	45 min.	1:55	2:40	6:00	7:00	☐A ☐B ☒C ☐D
Tiempo Total			6.00 Hr.		10 hrs. 20 Mins.		

Olla #1	Pulgadas		Conos de Escoria	Charola	Cono
	Iniciales	**Finales**			
Carga # #3	27	27	**Cantidad**	✓	1/4 Enc
Carga # #3	27" susia	11" susia			
Carga #	N		**Conos de Plomo**	Olla ☐2 ☐3 ☐4 ☐5 ☐ n/a	
Carga #	A		**Pulgadas de Plomo Olla #1**	17"	

Características del Producto (√)			
Escoria en el Horno	( ) No	(✓) Si, cantidad = 9"	
Escoria	(✓) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(✓) Normal
Ladrillos	(✓) Limpio	( ) Sucio	

Limpieza del Horno (√)	
Cajón de Plomo	(✓) Limpio ( ) Sucio
Canal	(✓) Limpio ( ) Sucio
Boca del Horno	(✓) Limpio ( ) Sucio
Realizado por:	O. Ayala

Responsabilidad de Operador						Responsabilidad de Supervisor		
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
8/1/12	☐ Am ☒ Pm 5:50	☐ 621 D ☐ 521 D ☒ 621 E	3,681	☐ Si ☒ No = +21	Juan	E.G.	☐ 6-2 ☒ 2-10 ☐ 10-6	#3
Rango de Tolerancia de los loaders 621D y 521D: 3580 a 3740lbs								

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	☒A ☐B ☐C ☐D	2-10	Edison Gonzalez	E.G.	8/1/12
Supervisor	☐A ☒B ☐C ☐D	10-6	Luis Marrero		1-Ago-12
Supervisor	☐A ☐B ☒C ☐D	6-2	J. Siervo		2-Ago-12
Supervisor	☐A ☐B ☐C ☐D				

Supervisor de Producción:	J. Siervo	**Fecha:**	J. Siervo 2/Ago/12
Supervisión de Calidad:		**Fecha:**	

Carga de Óxido en Horno No.1

Carga	Turno	Supervisor	Fecha
# 4	10-6	Luis Marrero	2-Ago-12

Datos de Carga Anterior

Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección Requerida (√)
Charola	17"	10 hr 20 mnt	(√) Si ( ) No

Material para Carga

Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)
Óxido	32,000	32,087
Plomo	8,000	8,074
Polvo de Filtro	2	2
Hierro	3,000	1,500 + 1,500
Carbón	2,900	2,893
Soda	3,300	3,300
Mezcla Pesada por:	O. Ayala	**Num.Loader:** 621-E

Flujo de Aceite

Flama baja SP.	150 ± 10
Valor Real	150
Flama Media SP.	220 ± 10
Valor Real	221
Flama Alta SP.	260 ± 10
Valor Real	260

Acompañamiento de la Carga

Acción	Flama	Tiempo Patrón	Tiempo Programado Inicial	Tiempo Programado Final	Tiempo Real Inicial	Tiempo Real Final	Turno
1er Cargamento	Baja	20 min.	7:00	7:20	7:00	7:50	☐A ☐B ☐C ☒D
Fundir	Media	1 Hr.	7:20	8:20	7:50	8:50	☐A ☐B ☐C ☐D
2do Cargamento	Baja	20 min.	8:20	8:40	8:50	9:40	☐A ☐B ☐C ☐D
Fundir	Media	1 Hr.	8:40	9:40	9:40	10:40	☐A ☐B ☐C ☐D
3er Cargamento	Baja	20 min.	9:40	10:00	10:40	11:40	☐A ☐B ☐C ☐D
Fundir	Alta	2.15 Hr.	10:00	12:15	11:40	5:00	☒A ☐B ☐C ☐D
Descarga	Baja	45 min.	12:15	1:00	3:00	4:00	☒A ☐B ☐C ☐D
Tiempo Total			6.00 Hr.		9 hrs		

Olla #1		Pulgadas Iniciales	Pulgadas Finales
Carga #	# 4	20"	1
Carga #			
Carga #	N/A	N/A	N/A
Carga #			

Conos de Escoria	Charola	Cono
Cantidad	1	N/A

Conos de Plomo	Olla ☐2 ☐3 ☐4 ☐5 ☐ n/a
Pulgadas de Plomo Olla #1	19"

Características del Producto (√)

Escoria en el Horno	( ) No	(√) Si, cantidad = 07	
Escoria	(√) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(√) Normal
Ladrillos	( ) Limpio	(√) Sucio	

Limpieza del Horno (√)

Cajón de Plomo	(√) Limpio ( ) Sucio
Canal	(√) Limpio ( ) Sucio
Boca del Horno	(√) Limpio ( ) Sucio
Realizado por:	Natal

Responsabilidad de Operador						Responsabilidad de Supervisor		
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
2-Ago-12	☑ Am ☐ Pm	☐ 621 D ☐ 521 D ☑ 621 E	3,700	☑ Si ☐ No = +40	O. Ayala	JM	☐ 6-2 ☐ 2-10 ☑ 10-6	#4
Rango de Tolerancia de los loaders 621D y 521D: 3580 a 3740lbs								

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	☐A ☒B ☐C ☐D	10-6	Luis Marrero	JM	2-Ago-12
Supervisor	☐A ☐B ☐C ☒D	6-2	Juan G Pereira	Juan G	1-2-12
Supervisor	☒A ☐B ☐C ☐D	2-10	Edson Gonzalez	E.G.	3/2/12
Supervisor	☐A ☐B ☐C ☐D				

Supervisor de Producción:		**Fecha:**	
Supervisión de Calidad:		**Fecha:**	

Carga de Óxido en Horno No.1

No. Carga	Turno	Supervisor	Fecha
1365	6-2	Juan G Reñer	8-2-12

Datos de Carga Anterior

Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección Requerida (√)
Charola	"19	9 hrs	(√) Si ( ) No

Material para Carga

Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)
Óxido	32,000	32,042
Plomo	8,000	8,017
Polvo de Filtro	2-	2-
Hierro	3,000	1,700 + 500 / 800
Carbón	2,900	2,921
Soda	3,300	3,300
Mezcla Pesada por:	Juan Espinoza	**Num.Loader:** 621E

Flujo de Aceite

Flama baja SP.	150 ± 10
Valor Real	151
Flama Media SP.	220 ± 10
Valor Real	221
Flama Alta SP.	260 ± 10
Valor Real	258

Acompañamiento de la Carga

Acción	Flama	Tiempo Patrón	Tiempo Programado Inicial	Tiempo Programado Final	Tiempo Real Inicial	Tiempo Real Final	Turno
1er Cargamento	Baja	20 min.	4:00	4:20	4:00	5:00	☑A □B □C □D
Fundir	Media	1 Hr.	4:20	5:20	5:00	6:00	☑A □B □C □D
2do Cargamento	Baja	20 min.	5:20	5:40	6:00	7:30	☑A □B □C □D
Fundir	Media	1 Hr.	5:40	6:40	7:30	8:30	☑A □B □C □D
3er Cargamento	Baja	20 min.	6:40	7:00	8:30	9:15	☑A □B □C □D
Fundir	Alta	2.15 Hr.	7:00	9:15	9:15	11:30	□A □B ☑C □D
Descarga	Baja	45 min.	9:15	10:00	11:30	12:50	□A □B ☑C □D
Tiempo Total			6.00 Hr.			8 hrs 50 Min	

Olla #1		Pulgadas Iniciales	Pulgadas Finales
Carga #	1365	55"-59	57"
Carga #			
Carga #	N/A	N/A	N/A
Carga #			

Conos de Escoria	Charola	Cono
Cantidad	✓	N/A

Conos de Plomo	12" Olla □2 □3 □4 □5 □ n/a
Pulgadas de Plomo Olla #1	+2" +1 Cono en el Suelo

Características del Producto (√)

Escoria en el Horno	( ) No	(√) Si, cantidad = 6"	
Escoria	( ) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	( ) Normal
Ladrillos	( ) Limpio	( ) Sucio	

Limpieza del Horno (√)

Cajón de Plomo	(√) Limpio ( ) Sucio
Canal	(√) Limpio ( ) Sucio
Boca del Horno	(√) Limpio ( ) Sucio
Realizado por:	A. Gonzalez

Responsabilidad de Operador: Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Responsabilidad de Supervisor: Verificado Visualmente Firma:	Turno	No. Carga
8-2-12	☑Am □Pm 11:50	□621 D □521 D ☑621 E	3,670	□Si ☑No = +10	Juan Espinoza	Juan G	☑6-2 □2-10 □10-6	1365

Rango de Tolerancia de los loaders 621D y 521D: 3580 a 3740lbs

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	□A □B □C ☑D	6-2	Juan G Reñer	Juan G	8-2-12
Supervisor	☑A □B □C □D	2-10	Edison Cornejo	E.C.	8/2/12
Supervisor	□A □B ☑C □D	10-6	Israel Soto		2-Agosto-12
Supervisor	□A □B □C □D	N/A	N/A	N/A	N/A

Supervisor de Producción:		**Fecha:**	
Supervisión de Calidad:		**Fecha:**	

Furnace # 2

Furnace 2

Run #1

Date 7/31/2012

From	To	Time (min)	Stage	Lot ID
13:16	13:51	35	2nd Charge	F2/Jul/2012/#25
15:08	15:33	25	3rd Charge	F2/Jul/2012/#25
20:34	21:34	60	Tap	F2/Jul/2012/#25
Total Sampling Time		120		

Run #2

Date 8/1/2012

From	To	Time (min)	Stage	Lot ID
8:19	8:39	20	1st Charge	F2/Aug/2012/#1
10:46	11:26	40	2nd Charge	F2/Aug/2012/#1
13:13	13:43	30	3rd Charge	F2/Aug/2012/#1
17:52	18:22	30	Tap	F2/Aug/2012/#1
Total Sampling Time		120		

Run #3

Date 8/2/2012

From	To	Time (min)	Stage	Lot ID
9:47	10:17	30	3rd Charge	F2/Aug/2012/#3
16:16	16:46	30	Tap	F2/Aug/2012/#3
17:10	18:10	60	1st Charge	F2/Aug/2012/#4
Total Sampling Time		120		

Carga de Óxido en Horno No.2

No. Carga	Turno	Supervisor	Fecha
#25	10-6	WS	7-31-12

Datos de Carga Anterior			
Escoria	**Plomo (Pulg.)**	**Tiempo de Corrida**	**Corrección Requerida (√)**
Charola	20"	10hr	( ) Si (✓) No

Material para Carga		
Materiales	**Peso Patrón(Lbs.)**	**Peso Medido (Lbs.)**
Óxido	40,000	40,030
Plomo	8,000	8,046
Polvo de Filtro	2	2
Hierro	3,800	2,500# 1,000#,300
Carbón	3,000	3,049
Soda	4,500	4,500
Mezcla Pesada por:	A. Ruiz	**Num.Loader:** 621E

Flujo de Aceite	
Flama baja SP.	220 ± 10
Valor Real	220
Flama Media SP.	280 ± 10
Valor Real	281
Flama Alta SP.	300 ± 10
Valor Real	300

Acompañamiento de la Carga							
Acción	**Flama**	**Tiempo Patrón**	**Tiempo Programado**		**Tiempo Real**		**Turno**
			Inicial	**Final**	**Inicial**	**Final**	
1er Cargamento	Baja	20 min.	11:00	11:20	11:00	12:00	□A □B □C ☑D
Fundir	Media	1 Hr.	11:20	12:20	12:00	1:00	□A □B □C ☑D
2do Cargamento	Baja	20 min.	12:20	12:40	1:00	1:50	□A □B □C ☑D
Fundir	Media	1 Hr.	12:40	1:40	1:50	2:50	□A □B □C ☑D
3er Cargamento	Baja	20 min.	1:40	2:00	2:50	3:40	☑A □B □C □D
Fundir	Alta	2.15 Hr.	2:00	4:15	3:40	8:30	☑A □B □C □D
Descarga	Baja	45 min.	4:15	5:00	8:30	9:40	☑A □B □C □D
Tiempo Total			6.00 Hr.				10hr comida

Olla #6		Pulgadas		Conos de Escoria	Charola	Cono
		Iniciales	**Finales**			
Carga #	#25	5'5"	33"	**Cantidad**	✓	N/A
Carga #						
Carga #	N/A	N/A		**Conos de Plomo**	Olla □6 □7 □8 □9 □ n/a	
Carga #				**Pulgadas de Plomo Olla #6**	22"	

Características del Producto (√)			
Escoria en el Horno	( ) No	(✓) Si, cantidad = 8"	
Escoria	(✓) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(✓) Normal
Ladrillos	(✓) Limpio	( ) Sucio	

Limpieza del Horno (√)	
Cajón de Plomo	( ) Limpio (✓) Sucio
Canal	( ) Limpio (✓) Sucio
Boca del Horno	(✓) Limpio ( ) Sucio
Realizado por:	J. Ruiz.

Responsabilidad de Operador						Responsabilidad de Supervisor		
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
7-31-12	☑ Am ☐ Pm 6:15	☐ 621 D ☐ 521 D ☑ 621 E	3,670	☐ Si ☑ No = +10	A. Ruiz	WS	☐ 6-2 ☐ 2-10 ☑ 10-6	#25
Rango de Tolerancia de los loaders 621D y 521D: 3580 a 3740lbs								

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	□A ☑B □C □D	10-6	Wilfredo S.	WS	7-31-12
Supervisor	□A □B □C ☑D	6:2	Juan Cortez	Juan C.	7-31-12
Supervisor	□A □B □C □D	2-10	N/A		7/31/12
Supervisor	□A □B □C □D				

Supervisor de Producción:		**Fecha:**	
Supervisión de Calidad:		**Fecha:**	

Carga de Óxido en Horno No.2

No. Carga	Turno	Supervisor	Fecha
#26	2do		7/31/12

Datos de Carga Anterior

Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección Requerida (√)
Chunky	22"	10h 45min	( ) Si (√) No

Material para Carga

Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)
Óxido	40.000	40 070
Plomo	8.000	8.020
Polvo de Filtro	2	2
Hierro	3800	2500+500+800
Carbón	3000	3010
Soda	4500	4500
Mezcla Pesada por:	JCruz	**Num.Loader:** 621E

Flujo de Aceite

Flama baja SP.	220 ± 10
Valor Real	200
Flama Media SP.	280 ± 10
Valor Real	270
Flama Alta SP.	300 ± 10
Valor Real	300

Acompañamiento de la Carga

Acción	Flama	Tiempo Patrón	Tiempo Programado		Tiempo Real		Turno
			Inicial	Final	Inicial	Final	
1er Cargamento	Baja	20 min.	9:40	9:10:00	9:40	10:40	☑A □B □C □D
Fundir	Media	1 Hr.	10:00	11:00	10:40	11:40	☑A ☑B □C □D
2do Cargamento	Baja	20 min.	10:00	11:20	11:40	12:40	☑A ☑B □C □D
Fundir	Media	1 Hr.	11:20	12:20	12:40	2:40	☑A ☑B □C □D
3er Cargamento	Baja	20 min.	12:40	12:40	2:40	3:00	☑A ☑B □C □D
Fundir	Alta	2.15 Hr.	12:40	2:55	3:00	6:50	☑A ☑B □C □D
Descarga	Baja	45 min.	2:55	3:40	6:50	7:40	☑A □B □C □D
Tiempo Total			6.00 Hr. 10hrs				

Olla #6	Pulgadas Iniciales	Pulgadas Finales
Carga # #26	33" Sucia	11"
Carga #		
Carga #		
Carga #		

Conos de Escoria	Charola	Cono
Cantidad	—	4 A

Conos de Plomo	Olla ☑6 □7 □8 □9 □ n/a
Pulgadas de Plomo Olla #6	22"

Características del Producto (√)

Escoria en el Horno	( ) No	(√) Si, cantidad = 7	
Escoria	(√) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(√) Normal
Ladrillos	(√) Limpio	( ) Sucio	

Limpieza del Horno (√)

Cajón de Plomo	(√) Limpio ( ) Sucio
Canal	(√) Limpio ( ) Sucio
Boca del Horno	(√) Limpio ( ) Sucio
Realizado por:	Rafael Cruz

Responsabilidad de Operador						Responsabilidad de Supervisor		
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
7/31/12	☐ Am ☑ Pm 4:00	☐621 D ☐521 D ☑621 E	3600	☐ Si ☑ No = -60	JCruz		☐ 6-2 ☑ 2-10 ☐ 10-6	#26

Rango de Tolerancia de los loaders 621D y 521D: 3580 a 3740lbs.

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	☑A □B □C □D	2-10			7/31/12
Supervisor	□A ☑B □C □D	10-6	Wilbert Ruiz		7-31-12
Supervisor	□A □B □C ☑D	6-2	Juan G Perez	Juan G	8-1-12
Supervisor	□A □B □C □D				

Supervisor de Producción:		**Fecha:**	
Supervisión de Calidad:		**Fecha:**	

Carga de Óxido en Horno No.2

No. Carga	Turno	Supervisor	Fecha
#1	10-6	W. Rej	8-1-12

Datos de Carga Anterior

Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección Requerida (√)
Charola	22"	1 abr 5	( ) Si (✓) No

Material para Carga

Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)
Óxido	40,000	40,016
Plomo	8,000	8,030
Polvo de Filtro	2	2
Hierro	3,800	2,500+1,000+320
Carbón	3,000	3,034
Soda	4,500	4,500
Mezcla Pesada por:	A. Rej	**Num.Loader:** 621-E

Flujo de Aceite

Flama baja SP.	220 ± 10
Valor Real	220
Flama Media SP.	280 ± 10
Valor Real	281
Flama Alta SP.	300 ± 10
Valor Real	300

Acompañamiento de la Carga

Acción	Flama	Tiempo Patrón	Tiempo Programado Inicial	Tiempo Programado Final	Tiempo Real Inicial	Tiempo Real Final	Turno
1er Cargamento	Baja	20 min.	8:30	8:50	8:30	9:30	□A □B □C ☒D
Fundir	Media	1 Hr.	8:50	9:50	9:30	10:30	□A □B □C □D
2do Cargamento	Baja	20 min.	9:50	10:10	10:30	11:40	□A □B □C ☒D
Fundir	Media	1 Hr.	10:10	11:10	11:40	12:40	□A □B □C ☒D
3er Cargamento	Baja	20 min.	11:10	11:30	12:40	2:05	□A □B □C ☒D
Fundir	Alta	2.15 Hr.	11:30	1:45	2:05	5:50	☒A □B □C □D
Descarga	Baja	45 min.	1:45	2:30	5:50	6:50	☒A □B □C □D
Tiempo Total			6.00 Hr.		10hrs. 20mins		

Olla #6		Pulgadas Iniciales	Pulgadas Finales
Carga #	#1	80"	58"
Carga #		N/A mg.	
Carga #			
Carga #			

Conos de Escoria	Charola	Cono
Cantidad	✓	N/A mg.
Conos de Plomo	Olla □6 □7 □8 □9 ☒n/a	
Pulgadas de Plomo Olla #6	27"	

Características del Producto (√)

Escoria en el Horno	( ) No	(✓) Si, cantidad = 10"	
Escoria	(✓) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(✓) Normal
Ladrillos	(✓) Limpio	( ) Sucio	

Limpieza del Horno (√)

Cajón de Plomo	( ) Limpio (✓) Sucio
Canal	( ) Limpio (✓) Sucio
Boca del Horno	(✓) Limpio ( ) Sucio
Realizado por:	J. Ruiz

Responsabilidad de Operador						Responsabilidad de Supervisor		
Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Verificado Visualmente Firma:	Turno	No. Carga
8-1-12	☑ Am ☐ Pm 4:00	☐621 D ☐521 D ☑621 E	3,624	☐ Si ☒ No = +14	A. Rej	WS	☐ 6-2 ☐ 2-10 ☒ 10-6	#1

Rango de Tolerancia de los loaders 621D y 521D: 3580 a 3740lbs

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	□A □B □C □D	10-6	Wilfredo B.		8-1-12
Supervisor	□A □B □C □D	6-2	Juan Gomez	Juan Go	8/1/12
Supervisor	□A □B □C □D	2-10	M. Cuna		8/1/12
Supervisor	□A □B □C □D		N/A mg.		

Supervisor de Producción:		**Fecha:**	
Supervisión de Calidad:		**Fecha:**	

Carga de Óxido en Horno No.2

No. Carga	Turno	Supervisor	Fecha
#2.	2-10	[illegible]	8/1/12.

Datos de Carga Anterior

Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección Requerida (√)
Charola	22"	10hr 20min	( ) Si (√) No

Material para Carga

Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)
Óxido	40000	40.090
Plomo	8.000	7.990
Polvo de Filtro	2.	2
Hierro	3800	2500+500+500+300
Carbón	3000	3050
Soda	4500	4500
Mezcla Pesada por:	J Cruz.	**Num.Loader:** 621E

Flujo de Aceite

Flama baja SP.	220 ± 10
Valor Real	260
Flama Media SP.	280 ± 10
Valor Real	270
Flama Alta SP.	300 ± 10
Valor Real	300

Acompañamiento de la Carga

Acción	Flama	Tiempo Patrón	Tiempo Programado Inicial	Tiempo Programado Final	Tiempo Real Inicial	Tiempo Real Final	Turno
1er Cargamento	Baja	20 min.	6:50	7:10	6:50.	7:12	☑A □B □C □D
Fundir	Media	1 Hr.	7:10	8:10	7:12.	8:50	☑A □B □C □D
2do Cargamento	Baja	20 min.	8:10	8:30	8:50	9:50	☑A □B □C □D
Fundir	Media	1 Hr.	8:30	9:30	9:50.	10:50	□A ☑B □C □D
3er Cargamento	Baja	20 min.	9:30	9:50	10:50	12:30	□A ☑B □C □D
Fundir	Alta	2.15 Hr.	9:50	12:05.	12:30	4:40	□A ☑B □C □D
Descarga	Baja	45 min.	12:05.	12:50	4:40	5:30	□A ☑B □C □D
Tiempo Total			6.00 Hr.		10hrs 40min		

Olla #6		Pulgadas Iniciales	Pulgadas Finales
Carga #	#2	58"	36"
Carga #			
Carga #			
Carga #			

Conos de Escoria	Charola	Cono
Cantidad	√	[illegible]

Conos de Plomo	Olla □6 □7 □8 □9 □ n/a
Pulgadas de Plomo Olla #6	22"

Características del Producto (√)

Escoria en el Horno	( ) No	(√) Si, cantidad = 7"	
Escoria	(√) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(√) Normal
Ladrillos	(√) Limpio	( ) Sucio	

Limpieza del Horno (√)

Cajón de Plomo	(√) Limpio ( ) Sucio
Canal	(√) Limpio ( ) Sucio
Boca del Horno	(√) Limpio ( ) Sucio
Realizado por:	J. Cruz

Responsabilidad de Operador: Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Responsabilidad de Supervisor: Verificado Visualmente Firma:	Turno	No. Carga
8/1/12	☐ Am ☑ Pm 2:30	☐621 D ☐521 D ☑621 E	3690	☐ Si ☑ No =+30	J Cruz	[illegible]	☐ 6-2 ☑ 2-10 ☐ 10-6	#2

Rango de Tolerancia de los loaders 621D y 521D 3580 a 3740lbs

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	☑A □B □C □D	2-10	[illegible]	[illegible]	8/1/12.
Supervisor	□A ☑B □C □D	10-6	Wilfredo Ruiz	[illegible]	8-1-12
Supervisor	□A □B □C □D				
Supervisor	□A □B □C □D				

Supervisor de Producción:	[illegible]	**Fecha:**	8/09/12
Supervisión de Calidad:		**Fecha:**	

Faltaba solo una hoja en la Soda en. 8/1/12

Battery Recycling Co.

Carga de Óxido en Horno No.2

No. Carga	Turno	Supervisor	Fecha
#3	10-6	w-Rey	8-2-12

Datos de Carga Anterior

Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección Requerida (√)
charola	22" olla #6	10 hrs 40 min	( ) Si (√) No

Material para Carga

Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)
Óxido	40,000	40,020
Plomo	8,000	8,017
Polvo de Filtro	2	2 MP
Hierro	3,800	2,500+1,500+1,000
Carbón	3,000	3,010
Soda	4,500	4,500
Mezcla Pesada por:	O.oyola	**Num.Loader:** 621-E

Flujo de Aceite

Flama baja SP.	220 ± 10
Valor Real	221
Flama Media SP.	280 ± 10
Valor Real	281
Flama Alta SP.	300 ± 10
Valor Real	300

Acompañamiento de la Carga

Acción	Flama	Tiempo Patrón	Tiempo Programado Inicial	Tiempo Programado Final	Tiempo Real Inicial	Tiempo Real Final	Turno
1er Cargamento	Baja	20 min.	5:30	5:50	5:30	6:30	☐A ☒B ☐C ☐D
Fundir	Media	1 Hr.	5:50	6:50	6:30	7:30	☐A ☐B ☐C ☒D
2do Cargamento	Baja	20 min.	6:50	7:10	7:30	8:30	☐A ☐B ☐C ☒D
Fundir	Media	1 Hr.	7:10	8:10	8:30	9:30	☐A ☐B ☐C ☒D
3er Cargamento	Baja	20 min.	8:10	8:30	9:30	10:40	☐A ☐B ☐C ☒D
Fundir	Alta	2.15 Hr.	8:30	10:45	10:40	~~11:00~~ 10:40	☐A ☐B ☐C ☐D
Descarga	Baja	45 min.	10:45	11:30	~~11:00~~ 10:40	5:10	☐A ☐B ☐C ☐D
Tiempo Total			6.00 Hr.				

Olla #6		Pulgadas Iniciales	Pulgadas Finales	Conos de Escoria	Charola	Cono
Carga #	#3	36"	16"	Cantidad	√	N/A
Carga #						
Carga #				Conos de Plomo	Olla ☐6 ☐7 ☐8 ☐9 ☒n/a	
Carga #				Pulgadas de Plomo Olla #6	20"	

Características del Producto (√)

Escoria en el Horno	( ) No	(√) Si, cantidad = 9"	
Escoria	(√) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(√) Normal
Ladrillos	(√) Limpio	( ) Sucio	

Limpieza del Horno (√)

Cajón de Plomo	( ) Limpio	(√) Sucio
Canal	( ) Limpio	( ) Sucio
Boca del Horno	(√) Limpio	( ) Sucio
Realizado por:		

Responsabilidad de Operador: Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma:	Responsabilidad de Supervisor: Verificado Visualmente Firma:	Turno	No. Carga
8-2-12	☑ Am ☐ Pm 1:30	☐621 D ☐521 D ☑621 E	3,650	☐ Si ☑ No = -10	O.oyola		☐ 6-2 ☐ 2-10 ☒ 10-6	#3

Rango de Tolerancia de los loaders 621D y 521D: 3580 a 3740lbs

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	☐A ☒B ☐C ☐D	10-6	Wilfredo B.		8-2-12
Supervisor	☐A ☐B ☐C ☒D	6-2	Juan G. Perez		8-2-12
Supervisor	☑A ☐B ☐C ☐D	2-10	Al Correa		8/02/12
Supervisor	☐A ☐B ☐C ☐D				

Supervisor de Producción:		Fecha:	
Supervisión de Calidad:		Fecha:	

Se ausento por visita. Le faltaba montar equipo 8/2/12

Carga de Óxido en Horno No.2

No. Carga	Turno	Supervisor	Fecha
#4	6-2	Juan G Pérez	8-2-12

Datos de Carga Anterior

Escoria	Plomo (Pulg.)	Tiempo de Corrida	Corrección Requerida (√)
Charla	20"	11 hrs 40 min	( ) Si ( ) No

Material para Carga

Materiales	Peso Patrón(Lbs.)	Peso Medido (Lbs.)
Óxido	40,000	40,035
Plomo	8,000	8,021
Polvo de Filtro	2-	2-
Hierro	3,800	2,500+500+900
Carbón	3,000	3,000
Soda	4,500	4,500
Mezcla Pesada por:	Juan Espinosa	Num.Loader: 621E

Flujo de Aceite

Flama baja SP.	220 ± 10
Valor Real	200
Flama Media SP.	280 ± 10
Valor Real	270
Flama Alta SP.	300 ± 10
Valor Real	300

Acompañamiento de la Carga

Acción	Flama	Tiempo Patrón	Tiempo Programado Inicial	Tiempo Programado Final	Tiempo Real Inicial	Tiempo Real Final	Turno
1er Cargamento	Baja	20 min.	5:10	5:30	5:10	6:10	☑A ☐B ☐C ☐D
Fundir	Media	1 Hr.	5:30	6:30	6:10	7:30	☑A ☐B ☐C ☐D
2do Cargamento	Baja	20 min.	6:30 6:50		7:30	8:30	☑A ☐B ☐C ☐D
Fundir	Media	1 Hr.	6:50	7:50	8:30	9:30	☑A ☐B ☐C ☐D
3er Cargamento	Baja	20 min.	7:50	8:10	9:30	10:30	☐A ☐B ☑C ☐D
Fundir	Alta	2.15 Hr.	8:10	10:25	10:30	3:40	☐A ☐B ☑C ☐D
Descarga	Baja	45 min.	10:25	11:10	3:40	4:40	☐A ☐B ☐C ☐D
Tiempo Total			6.00 Hr.		11 hr 30 min		

Olla #6	Pulgadas Iniciales	Pulgadas Finales
Carga # #4	Ho'sucio	Basio
Carga # #4	71"	49"
Carga # N/A	N/A	N/A
Carga # N/A	N/A	N/A

Conos de Escoria	Charola	Cono
Cantidad	✓	N/A
Conos de Plomo	Olla ☐6 ☐7 ☐8 ☐9 ☐ n/a	
Pulgadas de Plomo Olla #6	22"	

Características del Producto (√)

Escoria en el Horno	( ) No	(✓) Sí, cantidad = 8"	
Escoria	(✓) Liquida	( ) Espesa	( ) Gruesa
Color del Humo	( ) Negra Falta Hierro	( ) Blanca Falta Carbón	(✓) Normal
Ladrillos	(✓) Limpio	( ) Sucio	

Limpieza del Horno (√)

Cajón de Plomo	(✓) Limpio ( ) Sucio
Canal	(✓) Limpio ( ) Sucio
Boca del Horno	(✓) Limpio ( ) Sucio
Realizado por:	D. Curriel

Fecha	Hora	Loader Verificado	Peso Medido	Diferencia en Peso	Realizado Firma	Verificado Visualmente Firma	Turno	No. Carga
Responsabilidad de Operador						Responsabilidad de Supervisor		
8-2-12	☐ Am ☑ Pm 1230	☐621 D ☐521 D ☑621 E	3,679	☐ Si ☑ No = +19	Juan Espinosa	Juan G	☑ 6-2 ☐ 2-10 ☐ 10-6	#4

Rango de Tolerancia de los loaders 621D y 521D:3580 a 3740lbs

Supervisores	Turno	Hora	Nombre	Firma	Fecha
Supervisor	☐A ☐B ☐C ☑D	6-2	Juan G Pérez	Juan G	8-2-12
Supervisor	☑A ☐B ☐C ☐D	2-10	N Comm		8/2/12
Supervisor	☐A ☐B ☑C ☐D	10-6	Israel Soto		2-Agosto-12
Supervisor	☐A ☐B ☐C ☐D	N/A	N/A	N/A	N/A

Supervisor de Producción:		Fecha:	
Supervisión de Calidad:		Fecha:	

problema con la microvalvula no esta controlando. 8/2/12. Esta corriendo manual

Appendix B

Method 5 / 12
Particulate Matter
&
Inorganic Lead
Calculations

Furnace # 1

URS

SUMMARY OF RESULTS

Project Name:	Battery Recycling Corp.
Project Number:	39400681.00001
Site Location:	Furnace 1
Test Location:	Baghouse Inlet Duct

Parameters	Run - 1	Run - 2	Run - 3	Average
Run Times	14:03 - 20:06	12:36 - 20:03	11:01 - 19:23	
Date	7/31/2012	8/1/2012	8/2/2012	
Sample Time	120	120	120	
Vol. Sampled @ STP (ft3)	75.685	66.270	72.768	71.574
Moisture Content (% Vol.)	4.4	4.8	4.5	4.5
O2 (%)	20.0	20.0	20.0	20.0
CO2 (%)	1.0	1.0	1.0	1.0
Stack Gas Temperature (^{o}F)	178.8	177.9	179.3	179
Stack Velocity (ft/min.)	1,983	1,744	1,943	1,890
Gas Flow Rate (ACFM)	36,387	31,995	35,657	34,680
Gas Flow Rate (SCFM)	29,458	25,960	28,885	28,101
Gas Flow Rate (DSCFM)	28,174	24,723	27,598	26,832
Percent Isokinetic	99.6	99.4	97.7	98.9
Particulate Conc. (Grains/DSCF)	0.0019	0.0056	0.0041	0.0039
Particulate Conc. (MG/DSCM)	4.292	12.787	9.462	8.847
Particulate Mass Rate (pounds/hr)	0.453	1.184	0.978	0.872
Lead Conc. (Grains/DSCF)	0.000017	0.000022	0.000008	0.000016
Lead Mass Rate (pounds/hour)	0.0041	0.0048	0.0020	0.0036

STACK TEST CALCULATIONS

Project:	BRC	Barom. Psr.:	29.91		Calculated
Project No:		Static Psr.:	-8.2	Ps:	29.307
Source:	Furnace - 1	Delta H @:	1.8419	As:	18.348
Run No.:	1	Gamma:	0.9734	An:	0.000412
Date:	7/31/2012	Pitot Coef.:	0.838		
Sample Volume:	81.64	Stack Dia.:	58	,in.	
Sample Time:	120	Nozzle Dia.:	0.275	,in.	
O2 Conc.:	20	H2O Gain:	73.3	,ml	
CO2 Conc.:	1	Part. Weight:	0.0092	,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P Actual	Sq. Root	DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
1	0.28	0.52915	1.38	99	182
2	0.28	0.52915	1.38	100	181
3	0.25	0.5	1.28	100	182
4	0.25	0.5	1.28	102	184
5	0.30	0.547723	1.55	103	182
6	0.25	0.5	1.30	95	185
7	0.22	0.469042	1.15	95	180
8	0.23	0.479583	1.18	95	181
9	0.23	0.479583	1.18	95	181
10	0.23	0.479583	1.18	96	180
11	0.22	0.469042	1.15	96	179
12	0.20	0.447214	1.05	96	180
13	0.35	0.591608	1.80	90	175
14	0.42	0.648074	2.15	91	176
15	0.36	0.6	1.85	92	177
16	0.36	0.6	1.85	93	179
17	0.35	0.591608	1.80	94	179
18	0.32	0.565685	1.65	95	179
19	0.30	0.547723	1.55	96	180
20	0.24	0.489898	1.25	96	178
21	0.25	0.5	1.30	96	177
22	0.29	0.538516	1.50	96	174
23	0.30	0.547723	1.55	96	171
24	0.28	0.52915	1.45	96	170
AVERAGE	0.2816667	0.528336	1.4483333	95.95833333	178.83333

Project: BRC
Project No: 0
Source: Furnace - 1
Run No.: 1

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (Vl0)(0.04707)

Vwstd = 3.45 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 75.685 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.04

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.0

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 28.5

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 1,983.2 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 36,387.44 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 29,458.35 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 28,174.00 DSCFM

Vsstd = Qstd/As

Vsstd = 1535.56 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 1.00

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0019

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 0.45

STACK TEST CALCULATIONS

Project:	BRC	Barom. Psr.:	29.94		Calculated
Project No:	0	Static Psr.:	-8.3	Ps:	29.330
Source:	Furnace - 1	Delta H @:	1.8419	As:	18.348
Run No.:	2	Gamma:	0.9734	An:	0.000412
Date:	8/1/2012	Pitot Coef.:	0.838		
Sample Volume:	72.33	Stack Dia.:	58	,in.	
Sample Time:	120	Nozzle Dia.:	0.275	,in.	
O2 Conc.:	20	H2O Gain:	70.4	,ml	
CO2 Conc.:	1	Part. Weight:	0.0240	,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
	Actual	Sq. Root			
1	0.25	0.5	1.30	104	177
2	0.26	0.509902	1.35	104	181
3	0.23	0.479583	1.20	105	186
4	0.23	0.479583	1.20	106	182
5	0.21	0.458258	1.10	106	184
6	0.18	0.424264	0.92	107	180
7	0.18	0.424264	0.92	107	181
8	0.21	0.458258	1.10	108	180
9	0.21	0.458258	1.10	108	180
10	0.16	0.4	0.85	109	180
11	0.15	0.387298	0.80	109	175
12	0.26	0.509902	1.35	109	138
13	0.18	0.424264	0.92	100	177
14	0.21	0.458258	1.10	100	178
15	0.21	0.458258	1.10	100	179
16	0.21	0.458258	1.10	100	179
17	0.26	0.509902	1.35	101	174
18	0.25	0.5	1.30	101	176
19	0.25	0.5	1.30	95	181
20	0.21	0.458258	1.10	95	181
21	0.24	0.489898	1.25	96	180
22	0.24	0.489898	1.25	97	181
23	0.21	0.458258	1.10	98	180
24	0.21	0.458258	1.10	99	180
AVERAGE	0.2170833	0.464712	1.1316667	102.6666667	177.9167

Project: BRC
Project No: 0
Source: Furnace - 1
Run No.: 2

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (Vl0)(0.04707)

Vwstd = 3.31 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 66.270 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.05

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.0

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 28.4

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 1,743.8 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 31,994.97 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 25,959.59 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 24,723.33 DSCFM

Vsstd = Qstd/As

Vsstd = 1347.49 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 0.99

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0056

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 1.18

STACK TEST CALCULATIONS

Project:	BRC	Barom. Psr.:	29.97		Calculated
Project No:	0	Static Psr.:	-8.5	Ps:	29.345
Source:	Furnace - 1	Delta H @:	1.8419	As:	18.348
Run No.:	3	Gamma:	0.9734	An:	0.000412
Date:	8/2/2012	Pitot Coef.:	0.838		
Sample Volume:	79.35	Stack Dia.:	58	,in.	
Sample Time:	120	Nozzle Dia.:	0.275	,in.	
O2 Conc.:	20	H2O Gain:	72.1	,ml	
CO2 Conc.:	1	Part. Weight:	0.0195	,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P Actual	Sq. Root	DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
1	0.29	0.538516	1.50	97	175
2	0.35	0.591608	1.82	97	177
3	0.33	0.574456	1.70	97	179
4	0.31	0.556776	1.60	98	184
5	0.29	0.538516	1.50	99	181
6	0.26	0.509902	1.35	100	182
7	0.23	0.479583	1.20	103	180
8	0.24	0.489898	1.25	104	181
9	0.24	0.489898	1.25	105	180
10	0.23	0.479583	1.20	106	180
11	0.20	0.447214	1.05	107	178
12	0.23	0.479583	1.20	107	176
13	0.30	0.547723	1.55	106	178
14	0.32	0.565685	1.68	106	180
15	0.30	0.547723	1.55	105	181
16	0.30	0.547723	1.55	105	183
17	0.28	0.52915	1.45	104	183
18	0.27	0.519615	1.40	104	184
19	0.29	0.538516	1.50	104	184
20	0.29	0.538516	1.50	104	180
21	0.20	0.447214	1.05	104	180
22	0.24	0.489898	1.25	104	176
23	0.24	0.489898	1.25	104	173
24	0.24	0.489898	1.25	104	167
AVERAGE	0.2695833	0.517796	1.4	103.0833333	179.25

Project: BRC
Project No: 0
Source: Furnace - 1
Run No.: 3

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (VI0)(0.04707)

Vwstd = 3.39 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 72.768 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.04

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.0

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 28.5

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 1,943.4 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 35,656.68 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 28,885.28 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 27,598.16 DSCFM

Vsstd = Qstd/As

Vsstd = 1504.17 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 0.98

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0041

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 0.98

URS

TEST LAB DATA SHEET

PROJECT:	BRC	PROJECT NO.:	39400681
SOURCE:	Furnace 1	TEST DATE:	7/31/2012
TRAIN I.D.	1	TEST NO.:	1
COLLECTED BY:	MSM	CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	769.5	817.6	48.1
2	711.3	717.6	6.3
3	581.9	585.8	3.9
4	849.6	864.6	15.0
5			0.0
6			0.0
7			0.0
TOTAL	2912.3	2985.6	73.3

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	49.8950	49.9039	0.0089
REAGENT BLANK			0.0000
CORRECTED PROBE WASH *			0.0089
FILTER # 1	0.3516	0.3519	0.0003
FILTER # 2			0.0000
IMPINGERS			0.0000

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.0092

COMMENTS:

URS

TEST LAB DATA SHEET

PROJECT:	BRC	PROJECT NO.:	39400681
SOURCE:	Furnace 1	TEST DATE:	8/1/2012
TRAIN I.D.	1	TEST NO.:	2
COLLECTED BY:	MSM	CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	772.8	816.0	43.2
2	744.1	750.4	6.3
3	602.9	607.2	4.3
4	860.7	877.3	16.6
5			0.0
6			0.0
7			0.0
TOTAL	2980.5	3050.9	70.4

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	50.2163	50.2401	0.0238
REAGENT BLANK			0.0000
CORRECTED PROBE WASH *			0.0238
FILTER # 1	0.3448	0.3450	0.0002
FILTER # 2			0.0000
IMPINGERS			0.0000

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.0240

COMMENTS:

URS

TEST LAB DATA SHEET

PROJECT:	BRC	PROJECT NO.:	39400681
SOURCE:	Furnace 1	TEST DATE:	8/2/2012
TRAIN I.D.	1	TEST NO.:	3
COLLECTED BY:	MSM	CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	736.7	782.8	46.1
2	692.3	701.9	9.6
3	583.4	585.2	1.8
4	902.5	917.1	14.6
5			0.0
6			0.0
7			0.0
TOTAL	2914.9	2987.0	72.1

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	50.8247	50.8439	0.0192
REAGENT BLANK			0.0000
CORRECTED PROBE WASH *			0.0192
FILTER # 1	0.3529	0.3532	0.0003
FILTER # 2			0.0000
IMPINGERS			0.0000

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.0195

COMMENTS:

Project: Battery Recycling Company
Project No.: 39400681
Date: August 2, 2012

Lead Mass Emission Calculations

INPUT PARAMETERS

Lead	Total ug	grams/sample	Vmstd	Qstd	Mass Rate (lbs/hr)	Lead Concentration (grains/dscf)	Lead Concentration (mg/dscm)
Run 1	83	0.0000830	75.685	28,174	0.0040869	0.0000169	0.0387
Run 2	96.3	0.0000963	66.270	24,723	0.0047522	0.0000224	0.0513
Run 3	39.5	0.0000395	72.768	27,598	0.0019816	0.0000084	0.0192
			Average		0.0036069	0.0000159	0.0364
					Compliance Limit	0.000870	2.0
					Tons/year	0.01580	

Lead Mass Rate (lb/hr)

Mmr= (Mn)(Qstd)(60)/(Vmstd)(453.6)

Mn= grams/sample
Qstd= stack gas flow rate (dscfm)
Vmstd= volume of air sample (@ stp)

Lead Mass Rate (Tons/year)

mass rate (Tons/year) = mass rate(lbs/hr) * 24(hrs) * 365(days) / 2000(lbs/ton)

URS

Pre-Test / Cyclonic Flow Data Sheet

Project Name: **Battery Recycling Co.** Test No.: Pre Test Stack Dimensions: 58"

Project No.: **39400681.00001** Location: **Furnace # 1** Barometric Pressure: _____ in. Hg

Date: **7/30/2012** Personnel: MM,TG,RR Static Pressure: -6.3 in. H_2O

Test Time : Start : 16:40 Stop : 16:57

Pre-Traverse / Cyclonic Flow Check			
TRAVERSE POINT	VELOCITY PRESSURE (ΔP)	Degrees	Stack Temp.
1	0.36	1.0	183
2	0.38	1.0	183
3	0.42	1.4	183
4	0.42	2.6	183
5	0.36	0.0	183
6	0.36	7.0	183
7	0.28	8.0	182
8	0.28	6.0	182
9	0.26	6.0	182
10	0.26	7.0	182
11	0.26	9.0	183
12	0.3	2.0	183
13	0.35	0.0	
14	0.38	1.0	183
15	0.42	1.5	183
16	0.4	3.0	183
17	0.4	2.0	183
18	0.36	0.0	183
19	0.34	0.0	183
20	0.34	1.0	183
21	0.3	2.0	182
22	0.3	5.0	182
23	0.28	5.0	182
24	0.26	6.0	182
Average	0.34	3.23	183

PITOT LEAK CHECK (> 3")		
INITIAL	(+)	(-)
FINAL	(+)	(-)

NOTES: _____

Furnace # 1

Method 5 / 12
Particulate Matter
&
Inorganic Lead
Field Data Sheets

URS

STACK TEST DATA SHEET

Project:	Battery Recycling Co.	Barom. Psr.:	29.91
Project No:	39400681.00001	Static Psr.:	-0.2
Source:	Furnace # 1 Duct	Delta H @:	1.8419
Run No.:	1	Gamma:	0.9734
Date:	7-31-12	Pitot Coef.:	
Filter No.:		Stack Dia.:	58"
Meter Box I.D.:	1	Stack Area:	
Sample Box No.:	1	Port Length:	3.0"
Probe Heater Setting:	250	Port Dia.:	3"
Personnel:		Probe Liner:	Glass

Schematic of Stack

Filter G1015

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	SAMPLING TIME Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	14:03	0.0	0.28	1.38	106.675	99	254	254	182	64	2
2		5.0	0.28	1.38	109.40	100	257	251	181	59	2
3		10.0	0.25	1.28	111.80	100	257	249	182	52	3
4		15.0	0.25	1.28	115.70	102	256	250	184	53	3
5		20.0	0.30	1.55	119.30	103	256	253	182	54	3
6	① 14:28/15:43	25.0	0.25	1.30	122.40	95	257	253	185	57	3
7		30.0	0.22	1.15	125.80	95	258	257	180	51	3
8		35.0	0.23	1.18	128.90	95	257	253	181	53	3
9		40.0	0.23	1.18	132.20	95	257	253	181	54	3
10		45.0	0.23	1.18	135.00	96	257	258	180	55	3
11		50.0	0.22	1.15	137.90	96	257	250	179	55	3
12		55.0	0.20	1.05	141.10	96	258	253	180	55	2
1	② 16:18/19:06	1.00	0.35	1.80	144.110/144.205	90	246	262	175	58	4
2		1.05	0.42	2.15	148.00	91	240	241	176	55	4
3		1.10	0.36	1.85	151.90	92	241	238	177	58	4
4		1.15	0.36	1.85	155.85	93	240	238	179	59	4
5		1.20	0.35	1.80	159.50	94	241	237	179	60	3
6		1.25	0.32	1.65	164.00	95	241	240	179	61	3
7		1.30	0.30	1.55	167.00	96	241	240	180	55	3
8		1.35	0.24	1.25	171.00	96	241	238	178	52	3
9		1.40	0.25	1.30	173.90	96	241	244	177	51	3
10		1.45	0.29	1.50	177.60	96	241	243	174	51	3
11		1.50	0.30	1.55	180.90	96	241	240	171	51	3
12		1.55	0.28	1.45	184.50	96	241	244	170	51	3
	20:06	2.00			188.315						
		~~2.05~~									
AVERAGE					81.64						

LEAK CHECKS		
Pitot impact:	✓	✓
Pitot static:	✓	✓
Train initial:	0.0@15	0.0@5"
Train Final:	0.0@10	0.0@5"

NOZZLE MEASUREMENT		
I.D. No.:	~~B~~ 27	Changed nozzle mon
1	~~0.270~~ 0.275	
2	~~0.270~~ 0.275	
3	~~0.270~~ 0.275	
Avg.	~~0.270~~ 0.275	

STACK GAS ANALYSIS			
	CO2	O2	CO
1	1.0	20.0	
2	1.0	20.0	
3			
Avg.	#DIV/0!	#DIV/0!	

NOTES: ① end charging ② end of charging leak check between ports.

Operator Signature:

URS

M5/M12 TEST LAB DATA SHEET

PROJECT: **Battery Recycling** JOB NO.: **39400681.00001**
SOURCE: **Furnace # 1 Duct** DATE: 7-31-12
TRAIN I.D.: 1 TEST NO.: 1
COLLECTED BY: MSM CHKD. BY:

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	769.5	817.6	48.1
2	711.3	717.6	6.3
3	581.9	585.8	3.9
4	849.6	864.6	15.0
5			
6			
7			
TOTAL	2912.3	2985.6	73.3

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH	49.8950	49.9039	0.0089
REAGENT BLANK			
CORRECTED PROBE WASH*			
#1 FILTER G1045	0.3516	0.3519	0.0003
#2 FILTER			
IMPINGERS			
PARTICULATE COLLECTED			

*subtract reagent blank from probe wash

CALIBRATION WEIGHT

CALIBRATED VALUE, g	MEASURED VALUE, g	DIFFERENCE, g

URS

STACK TEST DATA SHEET

Project:	Battery Recycling Co.	Barom. Psr.:	29.94
Project No:	39400681.00001	Static Psr.:	-8.3
Source:	Furnace # 1 Duct	Delta H @:	1.8419
Run No.:	2	Gamma:	0.9734
Date:	8-1-12	Pitot Coef.:	
Filter No.:		Stack Dia.:	58"
Meter Box I.D.:	1	Stack Area:	
Sample Box No.:	03	Port Length:	3.0"
Probe Heater Setting:	250	Port Dia.:	3"
Personnel:	MM TG RR	Probe Liner:	Glass

Schematic of Stack

pitot ID PT-15

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	SAMPLING TIME Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	12:36	0.0	0.25	1.30	189.250	104	241	240	177	68	3.0
2		5.0	0.26	1.35	192.80	104	239	239	181	67	3.0
3		10.0	0.23	1.20	196.50	105	238	240	186	64	2.5
4		15.0	0.23	1.20	199.10	106	239	240	182	61	2.5
5		20.0	0.21	1.10	202.70	106	240	241	184	60	2.5
6		25.0	0.18	0.92	205.30	107	240	240	180	59	2
7		30.0	0.18	0.92	208.10	107	241	242	181	57	2
8		35.0	0.21	1.10	211.00	108	241	240	180	56	3
9		40.0	0.21	1.10	213.60	108	238	238	180	57	3
10		45.0	0.16	0.85	216.70	109	239	241	180	57	2
11		50.0	0.15	0.80	219.40	109	239	243	175	56	2
12		55.0	0.26	1.35	222.00	109	235	239	138	56	2
1 ①	13:36/14:55	1.00	0.18	0.92	225.000/225.065	100	242	246	177	64	2
2		1.05	0.21	1.10	227.90	100	239	242	178	52	3
3		1.10	0.21	1.10	230.70	100	236	242	179	52	3
4		1.15	0.21	1.10	233.70	100	235	237	179	54	3
5		1.20	0.26	1.35	236.60	101	241	242	174	55	3
6	③	1.25	0.25	1.30	239.80	101	239	242	176	55	3
7 ②	15:25/19:33	1.30	0.25	1.30	243.150	95	243	242	181	62	3
8		1.35	0.21	1.10	246.00	95	240	240	181	46	3
9		1.40	0.24	1.25	249.10	96	241	239	180	46	3
10		1.45	0.24	1.25	252.10	97	243	241	181	47	3
11		1.50	0.21	1.10	255.80	98	242	241	180	47	2
12		1.55	0.21	1.10	258.90	99	242	241	180	49	
	20:03	2.00			261.580						
		[illegible]									
AVERAGE					72.33						

LEAK CHECKS		
Pitot impact:	✓	✓
Pitot static:	✓	✓
Train initial:	0.0015	0.0 @ 6"
Train Final:	0.000 @ 10	0.0 @ 5"

NOZZLE MEASUREMENT	
I.D. No.:	
1	0.270
2	0.270
3	0.270
Avg.	0.270

STACK GAS ANALYSIS			
	CO2	O2	CO
1	1.0	20.0	
2	1.0	20.0	
3	1.0	20.0	
Avg.	#DIV/0!	#DIV/0!	

NOTES: ① end of 1st charge ② 2nd charge ③ tapping

Operator Signature:

URS

M5/M12 TEST LAB DATA SHEET

PROJECT: **Battery Recycling**
SOURCE: **Furnace # 1 Duct**
TRAIN I.D.: 3
COLLECTED BY: MSM

JOB NO.: **39400681.00001**
DATE: 8-1-12
TEST NO.: 2
CHKD. BY:

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	772.8	816.0	43.2
2	744.1	750.4	6.3
3	602.9	607.2	4.3
4	860.7	877.3	16.6
5			
6			
7			
TOTAL	2980.5	3050.9	70.4

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH	50.2163	50.2401	0.0238
REAGENT BLANK			
CORRECTED PROBE WASH*			
#1 FILTER	0.3448	0.3450	0.0002
#2 FILTER			
IMPINGERS			
PARTICULATE COLLECTED			

*subtract reagent blank from probe wash

CALIBRATION WEIGHT

CALIBRATED VALUE, g	MEASURED VALUE, g	DIFFERENCE, g

URS

STACK TEST DATA SHEET

Project:	Battery Recycling Co.	Barom. Psr.:	29.97
Project No:	39400681.00001	Static Psr.:	-8.5
Source:	Furnace # 1 Duct	Delta H @:	1.8419
Run No.:	3	Gamma:	0.9734
Date:	8-2-12	Pitot Coef.:	
Filter No.:		Stack Dia.:	58"
Meter Box I.D.:	1	Stack Area:	
Sample Box No.:	5	Port Length:	3.0"
Probe Heater Setting:	250	Port Dia.:	3"
Personnel:	MM TG RR	Probe Liner:	Glass

Schematic of Stack

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	SAMPLING TIME Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	11:01	0.0	0.29	1.50	261.725	97	234	240	175	62	3
2		5.0	0.35	1.82	265.10	97	238	239	177	57	3
3		10.0	0.33	1.70	269.00	97	240	240	179	56	3
4		15.0	0.31	1.100	272.70	98	239	239	184	60	3
5		20.0	0.29	1.50	276.40	99	239	238	181	60	3
6	①	25.0	0.26	1.35	280.00	100	241	240	182	60	3
7	11:31/14:58	30.0	0.23	1.20	283.245	103	240	239	180	64	2
8		35.0	0.24	1.25	286.40	104	239	240	181	58	2
9		40.0	0.24	1.25	289.50	105	241	238	180	55	2
10		45.0	0.23	1.20	292.70	106	240	240	180	55	2
11		50.0	0.20	1.05	295.70	107	240	239	178	56	2
12	②	55.0	0.23	1.20	298.80	107	239	238	176	56	2
1	15:28/18:23	1.00	0.30	1.55	301.940/302.100	106	240	242	178	63	2
2		1.05	0.32	1.68	304.00	106	237	238	180	60	2
3		1.10	0.30	1.55	305.20	105	237	237	181	60	2
4		1.15	0.30	1.55	308.80	105	241	239	183	56	2
5		1.20	0.28	1.45	311.90	104	239	240	183	57	2
6		1.25	0.27	1.40	315.10	104	242	242	184	57	2
7		1.30	0.29	1.50	319.10	104	240	240	184	57	2
8		1.35	0.29	1.50	325.90	104	241	240	180	58	2
9		1.40	0.20	1.05	329.00	104	241	243	180	58	2
10		1.45	0.24	1.25	332.20	104	243	240	176	58	2
11		1.50	0.24	1.25	335.70	104	241	242	173	59	2
12		1.55	0.24	1.25	338.70	104	242	244	167	60	2
	19:23	2.00			341.075						
AVERAGE					79.350						

LEAK CHECKS		
Pitot impact:	✓	✓
Pitot static:	✓	✓
Train initial:	0.0@15"	0.0 @ 10"
Train Final:	0.0@10	0.0 @ 5"

NOZZLE MEASUREMENT	
I.D. No.:	
1	.275
2	.275
3	.275
Avg.	.275

STACK GAS ANALYSIS			
	CO2	O2	CO
1	1.0	20.0	
2	1.0	20.0	
3	1.0	20.0	
Avg.	#DIV/0!	#DIV/0!	

NOTES: ① 1st charge ② tapping

Operator Signature:

URS

M5/M12 TEST LAB DATA SHEET

PROJECT: **Battery Recycling**
SOURCE: **Furnace # 1 Duct**
TRAIN I.D.: 5
COLLECTED BY: MSM

JOB NO.: **39400681.00001**
DATE: 8-22-12
TEST NO.: 3
CHKD. BY:

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	736.7	782.8	46.1
2	692.3	701.9	9.6
3	583.4	585.2	1.8
4	902.5	917.1	14.6
5			
6			
7			
TOTAL	2914.9	2987.0	72.1

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH	50.8247	50.8439	0.0192
REAGENT BLANK			
CORRECTED PROBE WASH*			
#1 FILTER G1205	0.3529	0.3532	0.0003
#2 FILTER			
IMPINGERS			
PARTICULATE COLLECTED			

*subtract reagent blank from probe wash

CALIBRATION WEIGHT

CALIBRATED VALUE, g	MEASURED VALUE, g	DIFFERENCE, g

URS

Pre-Test / Cyclonic Flow Data Sheet

Project Name: Battery Recycling Co.
Project No.: 39400681.00001
Date: 7/30/12

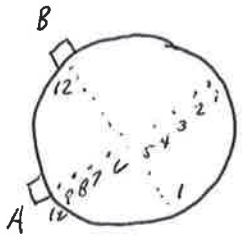
Test No.: Pre Test
Location: Furnace #1
Personnel: MM RRTG

Stack Dimensions: 60"
Barometric Pressure: _____ in. Hg
Static Pressure: -0.3 in. H_2O

Test Time : Start : 16:40 Stop : 16:57

Pre-Traverse / Cyclonic Flow Check			
TRAVERSE POINT	VELOCITY PRESSURE (ΔP)	Degrees	Stack Temp.
1	0.36	1.0	183
2	0.38	1.0	183
3	0.42	1.4	183
4	0.42	2.6	183
5	0.36	Ø	183
6	0.36	7.0	183
7	0.28	8.0	182
8	0.28	6.0	182
9	0.26	6.0	182
10	0.26	7.0	182
11	0.26	9.0	183
12	0.30	2.0	183
13	0.35	Ø	
14	0.38	1.0	183
15	0.42	1.5	183
16	0.40	3.0	183
17	0.40	2.0	183
18	0.36	Ø	183
19	0.34	Ø	183
20	0.34	1.0	183
21	0.30	2.0	182
22	0.30	5.0	182
23	0.28	5.0	182
24	0.26	6.0	182
Average	#DIV/0!	#DIV/0!	#DIV/0!

PITOT LEAK CHECK (> 3")		
INITIAL	(+) ✓	(-) ✓
FINAL	(+) ✓	(-) ✓



NOTES: _____

Appendix C

Method 5 / 12
Particulate Matter
&
Inorganic Lead
Calculations

Furnace # 2

URS

SUMMARY OF RESULTS

Project Name:	Battery Recycling Corp.
Project Number:	39400681.00001
Site Location:	Furnace 2
Test Location:	Baghouse Inlet Duct

Parameters	Run - 1	Run - 2	Run - 3	Average
Run Times	13:16 - 21:34	8:19 - 18:22	9:47 - 18:10	
Date	7/31/2012	8/1/2012	8/2/2012	
Sample Time	120	120	120	
Vol. Sampled @ STP (ft3)	79.640	80.326	75.730	78.565
Moisture Content (% Vol.)	4.4	4.8	5.0	4.7
O2 (%)	20.0	20.0	20.0	20.0
CO2 (%)	1.0	1.0	1.0	1.0
Stack Gas Temperature (°F)	178.5	175.4	177.9	177
Stack Velocity (ft/min.)	2,440	2,470	2,467	2,459
Gas Flow Rate (ACFM)	44,765	45,311	45,271	45,116
Gas Flow Rate (SCFM)	35,811	36,612	36,318	36,247
Gas Flow Rate (DSCFM)	34,237	34,863	34,487	34,529
Percent Isokinetic	104.3	103.3	98.5	102.1
Particulate Conc. (Grains/DSCF)	0.0064	0.0043	0.0049	0.0052
Particulate Conc. (MG/DSCM)	14.720	9.934	11.283	11.979
Particulate Mass Rate (pounds/hr)	1.888	1.297	1.458	1.548
Lead Conc. (Grains/DSCF)	0.000018	0.000018	0.000012	0.000016
Lead Mass Rate (pounds/hour)	0.0053	0.0053	0.0035	0.0047

STACK TEST CALCULATIONS

Project:	BRC	Barom. Psr.:	29.91		Calculated
Project No:		Static Psr.:	-13.1	Ps:	28.947
Source:	Furnace - 2	Delta H @:	1.8497	As:	18.348
Run No.:	1	Gamma:	0.9533	An:	0.000341
Date:	7/31/2012	Pitot Coef.:	0.836		
Sample Volume:	87.65	Stack Dia.:	58	,in.	
Sample Time:	120	Nozzle Dia.:	0.25	,in.	
O2 Conc.:	20	H2O Gain:	77.8	,ml	
CO2 Conc.:	1	Part. Weight:	0.0332	,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
	Actual	Sq. Root			
1	0.38	0.616441	1.25	98	176
2	0.40	0.632456	1.30	100	178
3	0.52	0.72111	1.72	102	180
4	0.49	0.7	1.62	103	181
5	0.48	0.69282	1.60	104	182
6	0.43	0.655744	1.45	105	181
7	0.34	0.583095	1.12	106	181
8	0.46	0.678233	1.60	103	169
9	0.46	0.678233	1.60	103	169
10	0.46	0.678233	1.60	102	162
11	0.38	0.616441	1.30	102	170
12	0.44	0.663325	1.65	102	168
13	0.45	0.67082	1.60	87	178
14	0.41	0.640312	1.42	87	175
15	0.42	0.648074	1.48	87	180
16	0.43	0.655744	1.50	87	183
17	0.40	0.632456	1.40	87	185
18	0.40	0.632456	1.40	88	186
19	0.35	0.591608	1.25	88	187
20	0.25	0.5	0.88	90	184
21	0.46	0.678233	1.60	90	185
22	0.50	0.707107	1.75	90	183
23	0.35	0.591608	1.25	91	182
24	0.46	0.678233	1.60	91	180
AVERAGE	0.4216667	0.647616	1.4558333	95.54166667	178.54167

Project: BRC
Project No: 0
Source: Furnace - 2
Run No.: 1

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (VI0)(0.04707)

Vwstd = 3.66 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 79.640 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.04

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.0

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 28.5

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 2,439.8 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 44,764.99 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 35,811.43 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 34,237.12 DSCFM

Vsstd = Qstd/As

Vsstd = 1866.01 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 1.04

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0064

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 1.89

STACK TEST CALCULATIONS

Project:	BRC	Barom. Psr.:	29.94		Calculated
Project No:	0	Static Psr.:	-11.5	Ps:	29.094
Source:	Furnace - 2	Delta H @:	1.8497	As:	18.348
Run No.:	2	Gamma:	0.9533	An:	0.000341
Date:	8/1/2012	Pitot Coef.:	0.836		
Sample Volume:	88.935	Stack Dia.:	58	,in.	
Sample Time:	120	Nozzle Dia.:	0.25	,in.	
O2 Conc.:	20	H2O Gain:	85.6	,ml	
CO2 Conc.:	1	Part. Weight:	0.0226	,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
	Actual	Sq. Root			
1	0.40	0.632456	1.42	84	174
2	0.46	0.678233	1.62	85	175
3	0.49	0.7	1.75	87	176
4	0.49	0.7	1.75	89	178
5	0.47	0.685565	1.68	99	174
6	0.48	0.69282	1.70	101	179
7	0.42	0.648074	1.50	101	181
8	0.43	0.655744	1.52	102	179
9	0.43	0.655744	1.52	103	180
10	0.43	0.655744	1.52	104	179
11	0.47	0.685565	1.68	105	184
12	0.42	0.648074	1.50	106	183
13	0.42	0.648074	1.50	106	166
14	0.37	0.608276	1.28	106	169
15	0.42	0.648074	1.50	106	168
16	0.49	0.7	1.75	106	171
17	0.47	0.685565	1.65	107	174
18	0.43	0.655744	1.52	107	177
19	0.37	0.608276	1.28	96	181
20	0.42	0.648074	1.50	97	180
21	0.44	0.663325	1.55	97	181
22	0.42	0.648074	1.50	98	180
23	0.36	0.6	1.25	98	181
24	0.42	0.648074	1.50	99	140
AVERAGE	0.4341667	0.658316	1.5391667	99.54166667	175.4167

Project: BRC
Project No: 0
Source: Furnace - 2
Run No.: 2

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (Vl0)(0.04707)

Vwstd = 4.03 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 80.326 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.05

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.0

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 28.4

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 2,469.6 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 45,310.88 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 36,612.20 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 34,863.44 DSCFM

Vsstd = Qstd/As

Vsstd = 1900.15 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 1.03

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0043

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 1.30

STACK TEST CALCULATIONS

Project:	BRC	Barom. Psr.:	29.97		Calculated
Project No:	0	Static Psr.:	-13.2	Ps:	28.999
Source:	Furnace - 2	Delta H @:	1.8497	As:	18.348
Run No.:	3	Gamma:	0.9533	An:	0.000341
Date:	8/2/2012	Pitot Coef.:	0.836		
Sample Volume:	86.300	Stack Dia.:	58	,in.	
Sample Time:	120	Nozzle Dia.:	0.25	,in.	
O2 Conc.:	20	H2O Gain:	85.4	,ml	
CO2 Conc.:	1	Part. Weight:	0.0242	,g	

TRAVERSE POINT NUMBER	VELOCITY DELTA P		DELTA H	DRY GAS METER TEMPERATURE	STACK TEMP.
	Actual	Sq. Root			
1	0.52	0.72111	1.82	96	183
2	0.54	0.734847	1.90	97	186
3	0.63	0.793725	2.10	97	186
4	0.56	0.748331	1.95	98	188
5	0.50	0.707107	1.75	99	187
6	0.45	0.67082	1.55	99	188
7	0.38	0.616441	1.32	114	161
8	0.35	0.591608	1.22	115	165
9	0.35	0.591608	1.22	116	168
10	0.33	0.574456	1.15	116	169
11	0.26	0.509902	0.90	118	167
12	0.20	0.447214	0.70	118	165
13	0.41	0.640312	1.45	124	170
14	0.46	0.678233	1.60	124	169
15	0.53	0.728011	1.85	125	172
16	0.52	0.72111	1.80	125	182
17	0.52	0.72111	1.80	125	198
18	0.45	0.67082	1.55	127	179
19	0.42	0.648074	1.45	127	186
20	0.38	0.616441	1.32	127	183
21	0.45	0.67082	1.55	127	181
22	0.30	0.547723	1.05	127	181
23	0.47	0.685565	1.65	127	178
24	0.47	0.685565	1.65	127	178
AVERAGE	0.4354167	0.65504	1.5125	116.4583333	177.9167

Project: BRC
Project No: 0
Source: Furnace - 2
Run No.: 3

Stack Sampling Calculations

Volume of Water Collected

Vwstd = (Vl0)(0.04707)

Vwstd = 4.02 cubic feet

Volume of Gas Metered, Standard Conditions

Vmstd = ((17.64) (Vm)(Pb + DeltaH/13.6)(gamma))/Tm

Vmstd = 75.730 cubic feet

Moisture Content

Bwo = Vwstd/(Vmstd + Vwstd)

Bwo = 0.05

Molecular Weight of the Dry Gas Stream

Md = (.44)(%CO2) + (.32)(%O2) + (.28)(%CO +%N2)

Md = 29.0

Molecular Weight of Stack Gas

Ms = (Md(1-Bwo) + 18(bwo)

Ms = 28.4

Velocity of Stack Gas

Vs = 174 Cp (DeltaP sq.rt.)((Ts+459.6) X 29.92 X 28.96/Ps/Ms)^.5

Vs = 2,467.4 ft/min

Total Flow of Stack Gas

Qa = As X Vs

Qa = 45,271.05 ACFM

Qs = Qa X 528/Ts X Ps/29.92

Qs = 36,317.68 SCFM

Qstd = Qs(1 - Bwo)

Qstd = 34,487.09 DSCFM

Vsstd = Qstd/As

Vsstd = 1879.63 ft/min

Percent Isokinetic

Is = Vmstd/(An X Time X Vsstd)

Is = 0.98

Particulate Concentration

Cs = (15.43)(Mn)/Vmstd

Cs = 0.0049

Particulate Mass Rate

Pmr = (Mn)(Qstd)(60)/(Vmstd)(453.6)

Pmr = 1.46

URS

TEST LAB DATA SHEET

PROJECT:	BRC	PROJECT NO.:	39400681
SOURCE:	Furnace 2	TEST DATE:	7/31/2012
TRAIN I.D.	1	TEST NO.:	1
COLLECTED BY:	MSM	CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	783.0	831.8	48.8
2	709.6	720.3	10.7
3	602.2	604.7	2.5
4	849.2	865.0	15.8
5			0.0
6			0.0
7			0.0
TOTAL	2944.0	3021.8	77.8

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	49.9050	49.9378	0.0328
REAGENT BLANK			0.0000
CORRECTED PROBE WASH *			0.0328
FILTER # 1	0.3483	0.3487	0.0004
FILTER # 2			0.0000
IMPINGERS			0.0000

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.0332

COMMENTS:

URS

TEST LAB DATA SHEET

PROJECT:	BRC	PROJECT NO.:	39400681
SOURCE:	Furnace 2	TEST DATE:	8/1/2012
TRAIN I.D.	2	TEST NO.:	2
COLLECTED BY:	MSM	CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	774.5	833.0	58.5
2	736.5	743.7	7.2
3	612.7	616.6	3.9
4	840.5	856.5	16.0
5			0.0
6			0.0
7			0.0
TOTAL	2964.2	3049.8	85.6

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	50.8684	50.8908	0.0224
REAGENT BLANK			0.0000
CORRECTED PROBE WASH *			0.0224
FILTER # 1	0.3478	0.3480	0.0002
FILTER # 2			0.0000
IMPINGERS			0.0000

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.0226

COMMENTS:

URS

TEST LAB DATA SHEET

PROJECT:	BRC	PROJECT NO.:	39400681
SOURCE:	Furnace 3	TEST DATE:	8/2/2012
TRAIN I.D.	5	TEST NO.:	3
COLLECTED BY:	MSM	CHKD BY:	

CONDENSATION

IMPINGER NO.	INITIAL VOL.,ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	743.3	796.7	53.4
2	732.0	738.0	6.0
3	605.1	616.6	11.5
4	897.2	911.7	14.5
5			0.0
6			0.0
7			0.0
TOTAL	2977.6	3063.0	85.4

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINIAL WT., g	NET WT., g
PROBE WASH	49.7704	49.7944	0.0240
REAGENT BLANK			0.0000
CORRECTED PROBE WASH *			0.0240
FILTER # 1	0.3587	0.3589	0.0002
FILTER # 2			0.0000
IMPINGERS			0.0000

* subtract reagent blank from probe wash

TOTAL PARTICULATED COLLECTED

PARTICULATE COLLECTED (excluding impinger catch)	0.0242

COMMENTS:

Project: Battery Recycling Company
Project No.: 39400681
Date: August 2, 2012

Lead Mass Emission Calculations

INPUT PARAMETERS

Lead	Total ug	grams/sample	Vmstd	Qstd	Mass Rate (lbs/hr)	Lead Concentration (grains/dscf)	Lead Concentration (mg/dscm)
Run 1	92.6	0.0000926	79.640	34,237	0.0053	0.0000179	0.0411
Run 2	92.9	0.0000929	80.326	34,863	0.0053	0.0000178	0.0408
Run 3	58.9	0.0000589	75.730	34,487	0.0035	0.0000120	0.0275
			Average		0.0047	0.0000159	0.0365
					Compliance Limit	0.000870	2.0
					Tons/year	0.0206548	

Lead Mass Rate (lb/hr)

Mmr= (Mn)(Qstd)(60)/(Vmstd)(453.6)

Mn= grams/sample
Qstd= stack gas flow rate (dscfm)
Vmstd= volume of air sample (@ stp)

Lead Mass Rate (Tons/year)

mass rate (Tons/year) = mass rate(lbs/hr) * 24(hrs) * 365(days) / 2000(lbs/ton)

URS

Pre-Test / Cyclonic Flow Data Sheet

Project Name: **Battery Recycling Co.** Test No.: **Pre Test** Stack Dimensions: **58"**

Project No.: **39400681.00001** Location: **Furnace # 2** Barometric Pressure: _____ in. Hg

Date: **7/30/2012** Personnel: **MM,TG,RR** Static Pressure: **-6.4** in. H_2O

Test Time : Start : **17:10** Stop : **17:23**

Pre-Traverse / Cyclonic Flow Check			
TRAVERSE POINT	VELOCITY PRESSURE (ΔP)	Degrees	Stack Temp.
1	0.4	0.0	184
2	0.39	0.0	184
3	0.4	4.0	184
4	0.42	3.0	183
5	0.38	9.0	183
6	0.38	7.0	183
7	0.33	7.0	183
8	0.31	5.0	183
9	0.3	5.2	181
10	0.31	6.8	182
11	0.28	8.3	182
12	0.32	7.4	181
13	0.42	1.0	183
14	0.41	0.0	183
15	0.41	1.0	184
16	0.39	1.2	184
17	0.35	2.0	185
18	0.34	3.0	185
19	0.34	3.8	185
20	0.32	7.7	185
21	0.3	9.1	183
22	0.27	6.2	183
23	0.27	7.1	180
24	0.25	5.0	181
Average	0.35	4.58	183

PITOT LEAK CHECK (> 3")		
INITIAL	(+)	(-)
FINAL	(+)	(-)

NOTES: _____

Method 5 / 12
Particulate Matter
&
Inorganic Lead
Field Data Sheets

Furnace # 2

URS

STACK TEST DATA SHEET

Schematic of Stack

Project:	Battery Recycling Co.	Barom. Psr.:	29.91
Project No:	39400681.00001	Static Psr.:	~~-0.05~~ -13.1
Source:	Furnace # 2 Duct	Delta H @:	1.8497
Run No.:	1	Gamma:	0.9533
Date:	7-31-12	Pitot Coef.:	
Filter No.:		Stack Dia.:	58"
Meter Box I.D.:	5	Stack Area:	
Sample Box No.:	2	Port Length:	3.0"
Probe Heater Setting:	250	Port Dia.:	3"
Personnel:	MM TG RR	Probe Liner:	Glass

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	SAMPLING TIME Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	13:16	0.0	0.38	1.25	917.215	98	255	250	176	66	3
2		5.0	0.40	1.30	920.30	100	255	247	178	61	3
3		10.0	0.52	1.72	923.70	102	253	250	180	62	5
4		15.0	0.49	1.62	927.50	103	256	249	181	61	5
5		20.0	0.48	1.60	931.00	104	253	251	182	61	5
6		25.0	0.43	1.45	935.10	105	254	247	181	57	5
7		30.0	0.34	1.12	938.80	106	255	249	181	55	4
8 ①	13:51/15:08	35.0	0.46	1.60	942.30	103	255	251	169	55	4
9		40.0	0.46	1.60	946.10	103	254	253	169	51	4
10		45.0	0.46	1.60	949.40	102	254	251	162	53	4
11		50.0	0.38	1.30	953.20	102	254	251	170	54	3
12		55.0	0.44	1.65	956.70	102	254	248	168	55	4
1 ②	15:33/20:34	1.00	0.45	1.60	960.20/960.820	87	245	260	178	62	5
2		1.05	0.41	1.42	966.60	87	247	252	175	59	4
3		1.10	0.42	1.48	969.20	87	246	250	180	61	4
4		1.15	0.43	1.50	972.80	87	246	256	183	57	4
5		1.20	0.40	1.40	975.90	87	247	255	185	53	4
6		1.25	0.40	1.40	979.70	88	245	250	186	51	4
7		1.30	0.35	1.25	983.60	88	245	255	187	49	4
8		1.35	0.25	0.88	987.20	90	245	250	184	50	3
9		1.40	0.46	1.60	989.70	90	246	250	185	51	5
10		1.45	0.50	1.75	993.60	90	246	261	183	50	5
11		1.50	0.35	1.25	997.50	91	245	253	182	51	5
12		1.55	0.46	1.60	1001.00	91	245	252	180	51	4
	21:34	2.00			1004.865						
		2.05									
AVERAGE					87.65						

LEAK CHECKS		
Pitot impact:	✓	✓
Pitot static:	✓	✓
Train initial:	0.0@15	0.0@10
Train Final:	0.0@10	0.0@6"

NOZZLE MEASUREMENT	
I.D. No.:	2
1	0.250
2	0.250
3	0.250
Avg.	0.250

STACK GAS ANALYSIS			
	CO2	O2	CO
1	1.0	20.0	
2	1.0	20.0	
3	1.0	20.0	
Avg.	#DIV/0!	#DIV/0!	

NOTES: ① end of charge ② end of 1 hr during charge

Operator Signature:

URS

M5/M12 TEST LAB DATA SHEET

PROJECT: **Battery Recycling**
SOURCE: **Furnace # 2 Duct**
TRAIN I.D.: 2
COLLECTED BY: MSM

JOB NO.: **39400681.00001**
DATE: 7-31-12
TEST NO.: 1
CHKD. BY:

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	783.0	831.8	43.2
2	709.6	720.3	6.3
3	602.2	604.7	4.3
4	849.2	865.0	16.6
5			
6			
7			
TOTAL	2980.5	3050.9	70.4

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH	49.9050	49.9378	0.0328
REAGENT BLANK			
CORRECTED PROBE WASH*			
#1 FILTER	0.3483	0.3487	0.0004
#2 FILTER			
IMPINGERS			
PARTICULATE COLLECTED			

*subtract reagent blank from probe wash

CALIBRATION WEIGHT

CALIBRATED VALUE, g	MEASURED VALUE, g	DIFFERENCE, g

URS

STACK TEST DATA SHEET

Project:	Battery Recycling Co.	Barom. Psr.:	29.94
Project No:	39400681.00001	Static Psr.:	-11.5
Source:	Furnace # 2 Duct	Delta H @:	1.8497
Run No.:	2	Gamma:	0.9533
Date:	8-1-12	Pitot Coef.:	
Filter No.:	G1176	Stack Dia.:	58"
Meter Box I.D.:	5	Stack Area:	
Sample Box No.:	4	Port Length:	3.0"
Probe Heater Setting:	250	Port Dia.:	3"
Personnel:	MM TG RR	Probe Liner:	Glass

Schematic of Stack

Probe ID:
pitot ID: PT-9

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	SAMPLING TIME Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	8:19	0.0	0.40	1.42	5.100	84	247	264	174	64	5
2		5.0	0.46	1.62	9.10	85	246	250	175	59	5
3		10.0	0.49	1.75	13.20	87	246	245	176	60	5
4		15.0	0.49	1.75	16.80	89	245	248	178	60	5
5	①8:39/10:46	20.0	0.47	1.68	20.335	99	247	254	174	64	5
6		25.0	0.48	1.70	23.40	101	244	242	179	49	5
7		30.0	0.42	1.50	28.20	101	247	250	181	50	5
8		35.0	0.43	1.52	31.80	102	246	247	179	52	5
9		40.0	0.43	1.52	35.00	103	246	245	180	52	5
10		45.0	0.43	1.52	39.10	104	247	241	179	52	5
11		50.0	0.47	1.68	42.50	105	246	242	184	52	5
12		55.0	0.42	1.50	46.30	106	247	243	183	53	5
1	②11:26/13:13	1.00	0.42	1.50	50.415/50.785	106	247	258	166	62	5
2		1.05	0.37	1.28	54.20	106	249	260	169	54	5
3		1.10	0.42	1.50	57.80	106	247	261	168	56	5
4		1.15	0.49	1.75	70.00	106	247	246	171	58	6
5		1.20	0.47	1.65	65.00	107	243	237	174	59	6
6		1.25	0.43	1.52	69.00	107	244	264	177	60	6
7	③13:43/④17:52	1.30	0.37	1.28	72.670	96	246	251	181	63	4
8		1.35	0.42	1.50	76.00	97	248	254	180	49	5
9		1.40	0.44	1.55	79.60	97	246	249	181	51	5
10		1.45	0.42	1.50	83.20	98	247	259	180	52	5
11		1.50	0.36	1.25	86.70	98	245	250	181	53	5
12		1.55	0.42	1.50	90.80	99	244	264	140	53	5
	18:22	2.00			94.035						
AVERAGE					88.935						

LEAK CHECKS		
Pitot impact:	✓	✓
Pitot static:	✓	✓
Train initial:	0.0@15	0.0@15
Train Final:	0.0@15	0.0@10"

NOZZLE MEASUREMENT	
I.D. No.:	
1	.250
2	.250
3	.250
Avg.	.250

STACK GAS ANALYSIS			
	CO2	O2	CO
1	1.0	20.0	
2	1.0	20.0	
3	1.0	20.0	
Avg.	#DIV/0!	#DIV/0!	

NOTES: ①end charging ②end of port A ③end charge #3 ④Tapping

Operator Signature:

URS

M5/M12 TEST LAB DATA SHEET

PROJECT: **Battery Recycling**
SOURCE: **Furnace # 2 Duct**
TRAIN I.D.: 4
COLLECTED BY: MSM

JOB NO.: **39400681.00001**
DATE: 8-1-12
TEST NO.: 2
CHKD. BY:

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	774.5	833.0	58.5
2	736.5	743.7	7.2
3	612.7	616.6	3.9
4	840.5	856.5	16.0
5			
6			
7			
TOTAL	2964.2	3049.8	85.6

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH	50.8684	50.8908	0.0224
REAGENT BLANK			
CORRECTED PROBE WASH*			
#1 FILTER	0.3478	0.3480	0.0002
#2 FILTER			
IMPINGERS			
PARTICULATE COLLECTED			

*subtract reagent blank from probe wash

CALIBRATION WEIGHT

CALIBRATED VALUE, g	MEASURED VALUE, g	DIFFERENCE, g

URS

STACK TEST DATA SHEET

Schematic of Stack

Project:	Battery Recycling Co.	Barom. Psr.:	29.97
Project No:	39400681.00001	Static Psr.:	-13.2
Source:	Furnace # 2 Duct	Delta H @:	1.8497
Run No.:	3	Gamma:	0.9533
Date:	8-2-12	Pitot Coef.:	
Filter No.:	G1204	Stack Dia.:	58"
Meter Box I.D.:	5	Stack Area:	
Sample Box No.:	6	Port Length:	3.0"
Probe Heater Setting:	250	Port Dia.:	3"
Personnel:	MM TG RR	Probe Liner:	Glass

TRAVERSE POINT NUMBER	SAMPLING TIME Clock	SAMPLING TIME Sample	VELOCITY DELTA P Actual	DELTA H	GAS SAMPLE VOLUME	DRY GAS METER TEMP.	PROBE TEMP.	FILTER BOX TEMP.	STACK TEMP.	LAST IMPINGER TEMP.	TRAIN VACUUM
1	9:47	0.0	0.52	1.82	94.220	96	246	243	183	49	5
2		5.0	0.54	1.90	97.90	97	246	242	186	47	5
3		10.0	0.63	2.10	102.00	97	247	242	186	50	6
4		15.0	0.56	1.95	106.20	98	247	241	188	55	5
5		20.0	0.50	1.75	110.80	99	244	249	187	57	5
6		25.0	0.45	1.55	115.10	99	246	247	188	57	5
7	①10:17/②16:16	30.0	0.38	1.32	118.260/118.450	114	245	241	161	48	6
8		35.0	0.35	1.22	122.20	115	245	250	165	48	6
9		40.0	0.35	1.22	124.90	116	246	249	168	48	6
10		45.0	0.33	1.15	128.10	116	247	247	169	48	6
11		50.0	0.26	0.90	130.30	118	246	248	167	52	5
12		55.0	0.20	0.70	133.70	118	245	248	165	52	5
1	③16:46/17:10	1.00	0.41	1.45	136.48/136.60	124	245	247	170	55	7
2		1.05	0.46	1.60	140.20	124	246	245	169	50	7
3		1.10	0.53	1.85	143.90	125	247	250	172	52	7
4		1.15	0.52	1.80	147.40	125	248	247	182	52	7
5		1.20	0.52	1.80	152.00	125	249	250	198	52	7
6		1.25	0.45	1.55	156.30	127	248	249	179	52	7
7		1.30	0.42	1.45	158.90	127	247	249	186	53	7
8		1.35	0.38	1.32	162.80	127	243	253	183	53	7
9		1.40	0.45	1.55	166.10	127	248	247	181	53	7
10		1.45	0.30	1.05	170.00	127	246	246	181	53	7
11		1.50	0.47	1.65	173.10	127	246	247	178	53	7
12		1.55	0.47	1.65	177.20	127	248	254	178	54	7
	18:10	2.00			180.520						
		2.05									
AVERAGE											

LEAK CHECKS		
Pitot impact:	✓	✓
Pitot static:	✓	✓
Train initial:	0.0@15	0.0@10"
Train Final:	0.0@15"	0.0@10"

NOZZLE MEASUREMENT	
I.D. No.:	
1	.250
2	.250
3	.250
Avg.	.250

STACK GAS ANALYSIS			
	CO2	O2	CO
1	1.0	20.0	
2	1.0	20.0	
3	1.0	20.0	
Avg.	#DIV/0!	#DIV/0!	

NOTES: ①charge 1 ②tapping ③charge

Operator Signature:

URS

M5/M12 TEST LAB DATA SHEET

PROJECT: **Battery Recycling**
SOURCE: **Furnace # 2 Duct**
TRAIN I.D.: 6
COLLECTED BY: MSM

JOB NO.: **39400681.00001**
DATE: 8-2-12
TEST NO.: 3
CHKD. BY:

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml/g	FINAL VOL., ml/g	NET GAIN, ml/g
1	743.3	796.7	53.4
2	732.0	738.0	6.0
3	605.1	616.6	11.5
4	897.2	911.7	14.5
5			
6			
7			
TOTAL	2977.6	3063.0	85.4

PARTICULATE

SAMPLE I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH	49.7704	49.7944	0.0240
REAGENT BLANK			
CORRECTED PROBE WASH*			
#1 FILTER G1204	0.3587	0.3589	0.0002
#2 FILTER			
IMPINGERS			
PARTICULATE COLLECTED			

*subtract reagent blank from probe wash

CALIBRATION WEIGHT

CALIBRATED VALUE, g	MEASURED VALUE, g	DIFFERENCE, g

URS

Pre-Test / Cyclonic Flow Data Sheet

Project Name: Battery Recycling Co.
Project No.: 39400681.00001
Date: 7/30/12

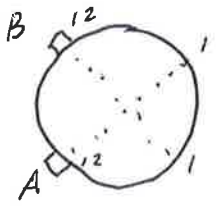
Test No.: Pre-test
Location: Furnace #2
Personnel: MM TG RR

Stack Dimensions: 60"
Barometric Pressure: _____ in. Hg
Static Pressure: -6.4 in. H_2O

Test Time : Start : 17:10 Stop : 17:23

Pre-Traverse / Cyclonic Flow Check			
TRAVERSE POINT	VELOCITY PRESSURE (ΔP)	Degrees	Stack Temp.
1	0.40	Ø	184
2	0.39	Ø	184
3	0.40	4.0	184
4	0.42	3.0	183
5	0.38	9.0	183
6	0.38	7.0	183
7	0.33	7.0	183
8	0.31	5.0	183
9	0.30	5.2	181
10	0.31	6.8	182
11	0.28	8.3	182
12	0.32	7.4	181
13	0.42	1	183
14	0.41	Ø	183
15	0.41	1.0	184
16	0.39	1.2	184
17	0.35	2.0	185
18	0.34	3.0	185
19	0.34	3.8	185
20	0.32	7.7	185
21	0.30	9.1	183
22	0.27	6.2	183
23	0.27	7.1	180
24	0.25	5.0	181
Average	#DIV/0!	#DIV/0!	#DIV/0!

PITOT LEAK CHECK (> 3")		
INITIAL	(+) ✓	(-) ✓
FINAL	(+) ✓	(-) ✓



NOTES: _____

Appendix D

Visible Emissions
Opacity

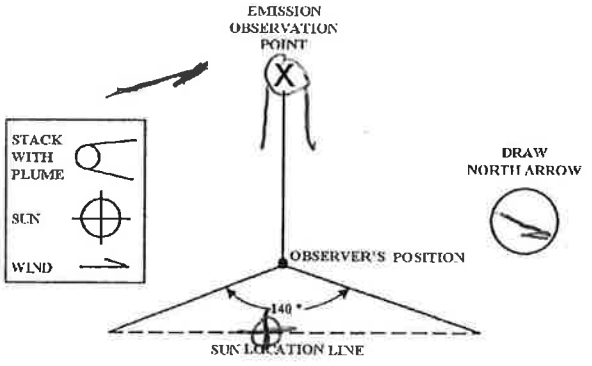
VISIBLE EMISSION OBSERVATION FORM Run #2

Company Name: Battery Recycling CO.			
Location: main stack			
City: Arecibo	State: P.R.	Zip:	
Process Equipment: Recycling lead Smelter		Operating Mode: Normal	
Control Equipment: Baghouse		Operating Mode: Normal	
Describe Emission Point: 80' tall circular stack			
Height of Emission Point: 80'	Height Relative to Observer: Start 74' End Same		
Distance to Emission Point: Start 240' End Same	Direction to Emission Point: Start WSW End Same		
Vertical Angle to Observation Pt. Start 30° End Same	Direction to Observation Point: Start ENE End Same		
Describe Emissions: Start Clear emissions End Same			
Emission Color: Start NA End Same	If Water Droplet Plume (Circle): Attached Detached (NA)		
Point In The Plume At Which Opacity Was Determined: Start 10' above stack End Same			
Describe Plume Background: Start blue sky End blue & gray skies mostly cloudy			
Background Color: Start blue End blue & dark gray	Sky Condition: Start ~~cloudy~~ mostly sunny End mostly cloudy		
Wind Speed: Start 0 End 0-5	Wind Direction: Start NA End SE		
Ambient Temp: Start 89°F End Same	Wet Bulb Temp:	RH Percent:	

Observation Date	Start Time	End Time
8-1-12	0820	1126

Min \ Sec	0	15	30	45	Comments
1	0	0	0	0	1st charge
2	0	0	0	0	Baghouse #2
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	stop 0840
21	0	0	0	0	Start 1046
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

SOURCE LAYOUT SKETCH



Observer's Name (Print): Robert Raymond	
Observer's Signature	Date: 8-1-12
Organization: URS Corporation	
Certified by: Carl Koontz & Associates	Date: 8-9-12

Additional Information

Continue on reverse side

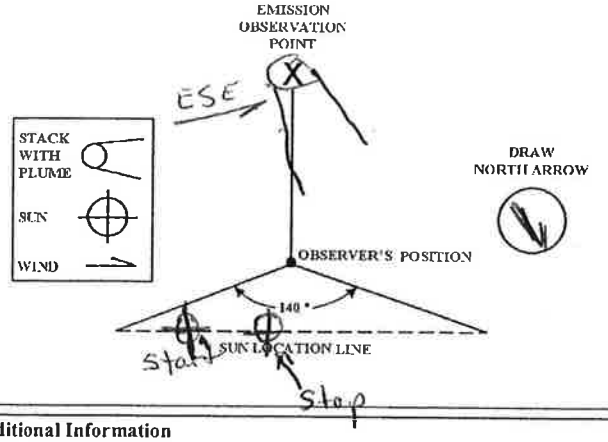
Min \ Sec	0	15	30	45	Comments
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					

Additional Information

VISIBLE EMISSION OBSERVATION FORM

Company Name Battery Recycling Co		
Location Main Stack		
City Arecibo	**State** P.R.	**Zip**
Process Equipment Recycling lead Smelter		**Operating Mode** Normal
Control Equipment Baghouse		**Operating Mode** Normal
Describe Emission Point 80' tall Circular Stack		
Height of Emission Point 80'	**Height Relative to Observer** Start 74' End Same	
Distance to Emission Point Start 240' End Same	**Direction to Emission Point** Start SSW End Same	
Vertical Angle to Observation Pt. Start 30° End Same	**Direction to Observation Point** Start NNE End Same	
Describe Emissions Start clear Emissions End Same		
Emission Color Start Clear End Same	**If Water Droplet Plume (Circle)** Attached Detached N/A	
Point In The Plume At Which Opacity Was Determined Start 10' From Stack exit End		
Describe Plume Background Start Blue sky & Gray clouds End Same		
Background Color Start blue/Gray End Same	**Sky Condition** Start Mostly cloudy End Same	
Wind Speed Start 0-5 End ~~5 MPH~~	**Wind Direction** Start ESE End Same	
Ambient Temp Start 85° F End 90° F	**Wet Bulb Temp**	**RH Percent**

SOURCE LAYOUT SKETCH



Additional Information

Observation Date 8-2-12	**Start Time** 0948	**End Time** 1123

Min \ Sec	0	15	30	45	Comments
1	0	0	0	0	1st charge
2	0	0	0	0	Baghouse #2
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print) Robert Raymond	
Observer's Signature	**Date** 8-2-12
Organization URS Corporation	
Certified by Carl Koontz & Associates	**Date** 4-9-12

Continue on reverse side

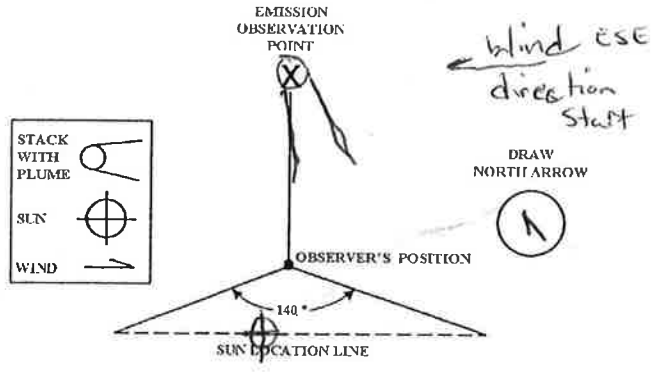
Min \ Sec	0	15	30	45	Comments
31					
32					
33					
34					
35					
36					
37					
38					
39					Stop 10:27am
40					Start 11:02am
41					charging furnace
42					#1
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					stop

Additional Information

VISIBLE EMISSION OBSERVATION FORM

Company Name	Battery Recycling Co.		
Location	Stack (main)		
City		**State** Puerto Rico	**Zip**
Process Equipment	Recycling Smelter	**Operating Mode**	Normal
Control Equipment	Baghouse	**Operating Mode**	Normal
Describe Emission Point	80' (Tall) Circular stack		
Height of Emission Point	80'	**Height Relative to Observer**	Start 74.5' End Same
Distance to Emission Point	Start 240' End Same	**Direction to Emission Point**	Start NNE End Same
Vertical Angle to Observation Pt.	Start 45° End Same	**Direction to Observation Point**	Start SSW End Same
Describe Emissions	Start Clear Emissions End Same		
Emission Color	Start N/A End Same	**If Water Droplet Plume (Circle)**	Attached Detached N/A
Point In The Plume At Which Opacity Was Determined	Start 10' N/NW of Stack Exit End Same		
Describe Plume Background	Start Overcast Gray sky End overcast dark Gray		
Background Color	Start Gray End Darkgray	**Sky Condition**	Start Overcast End Same
Wind Speed	Start 0-3 End 0-5	**Wind Direction**	Start ESE End Same
Ambient Temp	Start 95°F End Same	**Wet Bulb Temp**	**RH Percent**

SOURCE LAYOUT SKETCH



Observation Date	Start Time	End Time
7-31-12	1316	1416

Sec / Min	0	15	30	45	Comments
1	0	0	0	0	
2	0	0	0	0	
3	0	0	0	0	
4	0	0	0	0	
5	0	0	0	0	
6	0	0	0	0	
7	0	0	0	0	
8	0	0	0	0	
9	0	0	0	0	
10	0	0	0	0	
11	0	0	0	0	
12	0	0	0	0	
13	0	0	0	0	
14	0	0	0	0	
15	0	0	0	0	
16	0	0	0	0	
17	0	0	0	0	
18	0	0	0	0	
19	0	0	0	0	
20	0	0	0	0	
21	0	0	0	0	
22	0	0	0	0	
23	0	0	0	0	
24	0	0	0	0	
25	0	0	0	0	
26	0	0	0	0	
27	0	0	0	0	
28	0	0	0	0	
29	0	0	0	0	
30	0	0	0	0	

Observer's Name (Print)	Robert Raymond
Observer's Signature	**Date** 7-31-12
Organization	Carl Kaatz Associates
Certified by	UKS Corp **Date** 4-9-12

Additional Information

Continue on reverse side

Min \ Sec	0	15	30	45	Comments
31	0	0	0	0	
32	0	0	0	0	
33	0	0	0	0	
34	0	0	0	0	
35	0	0	0	0	
36	0	0	0	0	
37	0	0	0	0	
38	0	0	0	0	
39	0	0	0	0	
40	0	0	0	0	
41	0	0	0	0	
42	0	0	0	0	
43	0	0	0	0	
44	0	0	0	0	
45	0	0	0	0	
46	0	0	0	0	
47	0	0	0	0	
48	0	0	0	0	
49	0	0	0	0	
50	0	0	0	0	
51	0	0	0	0	
52	0	0	0	0	
53	0	0	0	0	
54	0	0	0	0	
55	0	0	0	0	
56	0	0	0	0	
57	0	0	0	0	
58	0	0	0	0	
59	0	0	0	0	
60	0	0	0	0	

Additional Information

Appendix E

THERMOCOUPLE READOUT CALIBRATION DATA FORM
(FOR K-TYPE THERMOCOUPLES)

Control Box / Thermocouple Readout Number:	urs 001		Calibrated By:	R.Raymond
Ambient Temperature:	70	°F	Date:	6/28/2012
Omega Engineering Calibrator	Model No.	22 TC	Serial #'s	174470

Primary Standards Directly Traceable t National Institute of Standards and Technology (NIST)

Reference[a] Source Temperature, (°F)	Test Thermometer Temperature, (°F)	Temperature Difference, %
0	1	0.22
200	201	0.15
400	397	0.35
600	600	0.00
1000	1001	0.07
1200	1199	0.06

Are all the Thermocouple Readout calibration points within calibration standard of <= to 1.5 %? **Yes**

$$\frac{\text{(Ref. Temp., oF + 460) - (Test Therm. Temp., oF + 460)}}{\text{Ref. Temp., oF + 460}} * 100 <= 1.5\ \%$$

Calibrator Signature: Robert Raymond Date: 6/28/2012

Approval Signature: [signature] Date: 6/28/2012

URS

DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	urs 001	CALIBRATED BY:	R. Raymond
CALIBRATION STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	69
CALIBRATION STANDARD ID:	328963	AMBIENT PRESSURE (In Hg):	29
DATE CALIBRATED:	7/19/2012	Secondary Standard Correction Factor	1.018

GAS VOLUME

Setting (delta H)	Gas Volume Metered (ft3) Secondary Standard	Gas Volume Corrected (ft3) Vw	Gas Volume DGM (ft3) Control Console Vd
0.5	5	5.090	5.271
1.0	5	5.090	5.292
2.0	11	11.198	11.698
3.0	10	10.180	10.635
4.0	10	10.180	10.620

TEMPERATURE

Calibrator Temperature (F) Tw	Average DGM (F) Td
71.0	78.0
71.0	79.0
71.0	82.0
72.0	83.0
71.0	85.0

CALCULATIONS

(min)	Gamma (Y)	Delta H@
13.23	0.9772	1.9352
9.19	0.9739	1.8640
14.28	0.9722	1.8495
10.31	0.9696	1.7532
9.1	0.9740	1.8076
	Avg Y	**Avg Delta H@**
	0.9734	**1.8419**
	0.9534	1.6419
Tolerances	0.9934	2.0419

Y = Ratio of reading of wet test meter to dry test meter; tolerance for individual values +/- 0.02 from average.

Delta H @ = Orfice pressure differential that equates to 0.75 cfm of air @ 68 degrees F and 29.92 inches of mercury, in.H2O: tolerance for individual values +/- 0.20 from average.

Is Unit Within Calibration Tolerances? **YES**

Calibrator: Robert Raymond Date: 7/19/2012

Approved by: Michael Moore Date: 7/20/12

THERMOCOUPLE READOUT CALIBRATION DATA FORM
(FOR K-TYPE THERMOCOUPLES)

Control Box / Thermocouple Readout Number: urs 005 Calibrated By: R.Raymond

Ambient Temperature: 70 °F Date: 12/28/2011

Omega Engineering Calibrator Model No. 22 TC Serial #'s 174470

Primary Standards Directly Traceable t National Institute of Standards and Technology (NIST)

Reference[a] Source Temperature, (°F)	Test Thermometer Temperature, (°F)	Temperature Difference, %
0	1	0.22
200	202	0.30
400	398	0.23
600	604	0.38
1000	1009	0.62
1200	1209	0.54

Are all the Thermocouple Readout calibration points within calibration standard of <= to 1.5 %? **Yes**

$$\frac{\text{(Ref. Temp., oF + 460) - (Test Therm. Temp., oF + 460)}}{\text{Ref. Temp., oF + 460}} * 100 <= 1.5\ \%$$

Calibrator Signature: Robert Raymond Date: 12/28/2011

Approval Signature: Michael Mowery Date: 1/3/12

URS

DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	urs 005	CALIBRATED BY:	R. Raymond
CALIBRATION STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	69
CALIBRATION STANDARD ID:	328963	AMBIENT PRESSURE (In Hg):	29
DATE CALIBRATED:	7/18/2012	Secondary Standard Correction Factor	1.018

GAS VOLUME

Setting (delta H)	Gas Volume Metered (ft3) Secondary Standard	Gas Volume Corrected (ft3) Vw	Gas Volume DGM (ft3) Control Console Vd
0.5	5	5.090	5.350
1.0	5	5.090	5.351
2.0	10	10.180	10.717
3.0	10	10.180	10.741
4.0	10	10.180	10.729

TEMPERATURE

Calibrator Temperature (F) Tw	Average DGM (F) Td
70.0	72.0
71.0	73.0
71.0	76.0
72.0	78.0
71.0	80.0

CALCULATIONS

(min)	Gamma (Y)	Delta H@
13.14	0.9538	1.9232
9.15	0.9524	1.8687
13.07	0.9540	1.8957
10.26	0.9512	1.7524
9.06	0.9552	1.8083
	Avg Y	**Avg Delta H@**
	0.9533	**1.8497**
	0.9333	1.6497
Tolerances	0.9733	2.0497

Y = Ratio of reading of wet test meter to dry test meter; tolerance for individual values +/- 0.02 from average.

Delta H @ = Orfice pressure differential that equates to 0.75 cfm of air @ 68 degrees F and 29.92 inches of mercury, in.H2O: tolerance for individual values +/- 0.20 from average.

Is Unit Within Calibration Tolerances? **YES**

Calibrator: Robert Raymond Date: 7/18/2012

Approved by: Michael Mowry Date: 7/20/12

Pitot Tube Calibration Data Sheet Calculation Printout

Pitot Tube Identification Number: PT-9 **Date:** 1/16/2012

Calibrated by: T.Brado

"A" Side Calibration

Run No.	ΔP_{std}	ΔP_s	$C_{p(s)}$	Absolute Deviation
1	1.50	2.10	0.837	0.0040
2	1.50	2.06	0.845	0.0041
3	1.50	2.08	0.841	0.0000

Average $C_{p(s)}$ (Side A): **0.841** | **0.0027**

"B" Side Calibration

Run No.	ΔP_{std}	ΔP_s	$C_{p(s)}$	Absolute Deviation
1	1.50	2.12	0.833	0.0013
2	1.50	2.14	0.829	0.0026
3	1.50	2.12	0.833	0.0013

Average $C_{p(s)}$ (Side B): **0.831** | **0.0017**

Average $C_{p(s)}$ Difference: **0.0093**

Average $C_{p(s)}$ ($C_{p(s)}$(A)+$C_{p(s)}$(B))/2: **0.836**

Acceptance Criteria

Average Deviation (Side A) : Must be ≤ 0.01	PASS
Average Deviation (Side B) : Must be ≤ 0.01	PASS
Average $C_{p(s)}$ Difference : Must be ≤ 0.01	PASS

Calibrator: _____ Date: 1/16/12

Supervisor: _____ Date: 1/17/12

Pitot Tube Calibration Data Sheet Calculation Printout

Pitot Tube Identification Number: PT-15 **Date:** 1/16/2012

Calibrated by: T.Brado

"A" Side Calibration

Run No.	ΔP_{std}	ΔP_s	$C_{p(s)}$	Absolute Deviation
1	1.50	2.11	0.835	0.0060
2	1.50	2.05	0.847	0.0061
3	1.50	2.08	0.841	0.0000

Average $C_{p(s)}$ (Side A): **0.841** | **0.0041**

"B" Side Calibration

Run No.	ΔP_{std}	ΔP_s	$C_{p(s)}$	Absolute Deviation
1	1.55	2.19	0.833	0.0032
2	1.60	2.20	0.844	0.0082
3	1.55	2.20	0.831	0.0051

Average $C_{p(s)}$ (Side B): **0.836** | **0.0055**

Average $C_{p(s)}$ Difference: **0.0047**

Average $C_{p(s)}$ $(C_{p(s)}(A)+C_{p(s)}(B))/2$: **0.838**

Acceptance Criteria

Average Deviation (Side A) : Must be ≤ 0.01 — **PASS**

Average Deviation (Side B) : Must be ≤ 0.01 — **PASS**

Average $C_{p(s)}$ Difference : Must be ≤ 0.01 — **PASS**

Calibrator: [signature] Date: 1/16/12

Supervisor: [signature] Date: 1/17/12

URS

DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	urs 001	CALIBRATED BY:	R. Raymond
CALIBRATION STANDARD:	Secondary	AMBIENT TEMPERATURE (F):	69
CALIBRATION STANDARD ID:	328963	AMBIENT PRESSURE (In Hg):	29
DATE CALIBRATED:	8/13/2012	Secondary Standard Correction Factor	1.018

GAS VOLUME

Setting (delta H)	Gas Volume Metered (ft3) Secondary Standard	Gas Volume Corrected (ft3) Vw	Gas Volume DGM (ft3) Control Console Vd
0.5	5	5.090	5.275
1.0	6	6.108	6.380
2.0	10	10.180	10.658
3.0	10	10.180	10.705
4.0	10	10.180	10.693

TEMPERATURE

Calibrator Temperature (F) Tw	Average DGM (F) Td
71.0	81.0
71.0	81.0
72.0	84.0
71.0	86.0
72.0	86.0

CALCULATIONS

(min)	Gamma (Y)	Delta H@
13.22	0.9819	1.9215
11.11	0.9729	1.8849
13.09	0.9718	1.8806
10.43	0.9704	1.7777
9.14	0.9673	1.8270
	Avg Y	**Avg Delta H@**
	0.9729	**1.8584**
	0.9529	1.6584
Tolerances	0.9929	2.0584

Y = Ratio of reading of wet test meter to dry test meter; tolerance for individual values +/- 0.02 from average.

Delta H @ = Orifice pressure differential that equates to 0.75 cfm of air @ 68 degrees F and 29.92 inches of mercury, in.H2O: tolerance for individual values +/- 0.20 from average.

Is Unit Within Calibration Tolerances? **YES**

Calibrator: Robert Raymond Date: 8/13/2012

Approved by: Date: 8/13/2012

URS

DRY GAS METER CALIBRATION SPREADSHEET

CONTROL BOX ID:	urs 005		CALIBRATED BY:	R. Raymond
CALIBRATION STANDARD:		Secondary	AMBIENT TEMPERATURE (F):	69
CALIBRATION STANDARD ID:		328963	AMBIENT PRESSURE (In Hg):	29
DATE CALIBRATED:		8/13/2012	Secondary Standard Correction Factor	1.018

GAS VOLUME

Setting (delta H)	Gas Volume Metered (ft3) Secondary Standard	Gas Volume Corrected (ft3) Vw	Gas Volume DGM (ft3) Control Console Vd
0.5	5	5.090	5.378
1.0	5	5.090	5.386
2.0	10	10.180	10.794
3.0	10	10.180	10.767
4.0	10	10.180	10.793

TEMPERATURE

Calibrator Temperature (F) Tw	Average DGM (F) Td
71.0	76.0
71.0	77.0
73.0	81.0
73.0	83.0
73.0	84.0

CALCULATIONS

(min)	Gamma (Y)	Delta H@
13.28	0.9542	1.9571
9.12	0.9533	1.8426
13.11	0.9524	1.9040
10.42	0.9559	1.7975
9.09	0.9530	1.8206
	Avg Y	**Avg Delta H@**
	0.9538	**1.8644**
	0.9338	1.6644
Tolerances	0.9738	2.0644

Y = Ratio of reading of wet test meter to dry test meter; tolerance for individual values +/- 0.02 from average.

Delta H @ = Orfice pressure differential that equates to 0.75 cfm of air @ 68 degrees F and 29.92 inches of mercury, in.H2O: tolerance for individual values +/- 0.20 from average.

Is Unit Within Calibration Tolerances? **YES**

Calibrator: Robert Raymond Date: 8/13/2012

Approved by: [signature] Date: 8/13/2012

URS

Spinning Vane Calibration Data Sheet Calculation

Pitot Tube Identification Number: Spinning Vane **Date:** 3/5/2012

Calibrated by: T Gregg

Clockwise Calibration				
Run No.	Standard Pitot (ft/min)	Spinning Vane (ft/min)	$C_{p(s)}$	Absolute Deviation
1	4973	4865	1.001	0.0090
2	4856	4872	0.988	0.0035
3	4923	4959	0.986	0.0055
	Average $C_{p(s)}$		**0.992**	**0.0060**

Counter Clockwise Calibration				
Run No.	Standard Pitot (ft/min)	Spinning Vane (ft/min)	$C_{p(s)}$	Absolute Deviation
1	4867	4815	0.995	0.0002
2	4879	4849	0.993	0.0021
3	4886	4817	0.997	0.0019
	Average $C_{p(s)}$		**0.995**	**0.0014**

Average $C_{p(s)}$ Difference	**0.0033**
Average $C_{p(s)}$ ($C_{p(s)}$(CW)+$C_{p(s)}$(CCW))/2	**0.994**

Acceptance Criteria

Average Deviation (CW) : Must be ≤ 0.01	**PASS**
Average Deviation (CCW) : Must be ≤ 0.01	**PASS**
Average $C_{p(s)}$ Difference : Must be ≤ 0.01	**PASS**

Calibrator: Date: 3/5/2012

Supervisor: Date: 3/5/2012

Appendix F

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

ANALYTICAL REPORT

PROJECT NO. 39400681.00001

Battery Recycling Co., Inc.

Lot #: H2H150402

Todd Gregg

URS Corporation
1093 Commerce Park Dr
Suite 100
Oak Ridge, TN 37830

TESTAMERICA LABORATORIES, INC.

Kevin S. Woodcock
Project Manager

August 27, 2012

ANALYTICAL METHODS SUMMARY

H2H150402

PARAMETER	ANALYTICAL METHOD
Inorganic Lead Emissions	CFR60A 12

References:

CFR60A "Test Methods", 40 CFR, Part 60, Appendix A, July 1, 1993.

SAMPLE SUMMARY

H2H150402

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
MV5EH	001	AQS-2987,86,85,84 FURNACE 2 RUN 3	08/02/12	
MV5EJ	002	AQS-2983,82,81 FURNACE 1 RUN 3	08/02/12	
MV5EK	003	AQS-2980,79,78,77 FURNACE 2 RUN 2	08/01/12	
MV5EL	004	AQS-2976,75,74,73 FURNACE 1 RUN 2	08/01/12	
MV5EM	005	AQS-2972,71,70,69 FURNACE 2 RUN 1	07/31/12	
MV5EN	006	AQS-2968,67,66 FURNACE 1 RUN 1	07/31/12	
MV5EP	007	AQS-2965,64,63 BLANK	08/02/12	

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

PROJECT NARRATIVE
H2H150402

The results reported herein are applicable to the samples submitted for analysis only. If you have any questions about this report, please call (865) 291-3000 to speak with the TestAmerica project manager listed on the cover page.

This report shall not be reproduced except in full, without the written approval of the laboratory.

The original chain of custody documentation is included with this report.

Sample Receipt

There were no problems with the condition of the samples received.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

These stack gas samples were prepared and analyzed using TestAmerica Knoxville standard operating procedure KNOX-MT-0016 which is based on Method 12, "Determination of Inorganic Lead Emissions from Stationary Sources". SW-846 Method 6010B as incorporated in TestAmerica Knoxville standard operating procedure KNOX-MT-0007 was used to perform the final instrument analysis.

Acid digestion was performed on the front half particulate filter, the nitric acid probe rinse and the nitric acid impinger solution as a combined sample using HNO_3 and H_2O_2. This digestate was adjusted to final volume and analyzed for lead by ICP.

Lead results were calculated using the following equation:

$$\text{Result, ug} = (\text{Raw Sample Concentration, µg/L}) \times (\text{Bench Dilution Factor}) \times (\text{Final Digestate Volume, L})$$

The serial dilution of sample AQS-2980, 79, 78, 77 FURNACE 2 RUN 2 was slightly outside control limits for lead due to physical or chemical matrix interferences.

CERTIFICATION SUMMARY

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Knoxville	L-A-B	DoD ELAP		L2311
TestAmerica Knoxville	Arkansas DEQ	State Program	6	88-0688
TestAmerica Knoxville	California	State Program	9	2423
TestAmerica Knoxville	Colorado	State Program	8	N/A
TestAmerica Knoxville	Connecticut	State Program	1	PH-0223
TestAmerica Knoxville	Florida	NELAC	4	E87177
TestAmerica Knoxville	Georgia	State Program	4	906
TestAmerica Knoxville	Hawaii	State Program	9	N/A
TestAmerica Knoxville	Indiana	State Program	5	C-TN-02
TestAmerica Knoxville	Iowa	State Program	7	375
TestAmerica Knoxville	Kansas	NELAC	7	E-10349
TestAmerica Knoxville	Kentucky	State Program	4	90101
TestAmerica Knoxville	Louisiana DOHH	State Program	6	LA110001
TestAmerica Knoxville	Louisiana DEQ	NELAC	6	83979
TestAmerica Knoxville	Maryland	State Program	3	277
TestAmerica Knoxville	Michigan	State Program	5	9933
TestAmerica Knoxville	Minnesota	NELAC	5	047-999-429
TestAmerica Knoxville	Nevada	State Program	9	TN00009
TestAmerica Knoxville	New Jersey	NELAC	2	TN001
TestAmerica Knoxville	New York	NELAC	2	10781
TestAmerica Knoxville	North Carolina DENR	State Program	4	64
TestAmerica Knoxville	North Carolina DHHS	State Program	4	21705
TestAmerica Knoxville	Ohio	OVAP	5	CL0059
TestAmerica Knoxville	Oklahoma	State Program	6	9415
TestAmerica Knoxville	Pennsylvania	NELAC	3	68-00576
TestAmerica Knoxville	South Carolina	State Program	4	84001
TestAmerica Knoxville	Tennessee	State Program	4	2014
TestAmerica Knoxville	Texas	NELAC	6	T104704380-TX
TestAmerica Knoxville	Federal	USDA		P330-11-00035
TestAmerica Knoxville	Utah	NELAC	8	QUAN3
TestAmerica Knoxville	Virginia	NELAC	3	460176
TestAmerica Knoxville	Virginia	State Program	3	165
TestAmerica Knoxville	Washington	State Program	10	C593
TestAmerica Knoxville	West Virginia DEP	State Program	3	345
TestAmerica Knoxville	West Virginia DHHR	State Program	3	9955C

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

QC DATA ASSOCIATION SUMMARY

H2H150402

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	AIR	CFR60A 12		2233100	
002	AIR	CFR60A 12		2233100	
003	AIR	CFR60A 12		2233100	
004	AIR	CFR60A 12		2233100	
005	AIR	CFR60A 12		2233100	
006	AIR	CFR60A 12		2233100	
007	AIR	CFR60A 12		2233100	

Sample Data Summary

URS Corporation

Client Sample ID: AQS-2987,86,85,84 FURNACE 2 RUN 3

TOTAL Metals

Lot-Sample #...: H2H150402-001 Matrix.....: AIR
Date Sampled...: 08/02/12 Date Received..: 08/14/12

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 2233100						
Lead	58.9	1.0	ug	CFR60A 12	08/21-08/23/12	MV5EH1AA
		Dilution Factor: 1		Analysis Time..: 14:25	MDL.....: 0.35	

URS Corporation

Client Sample ID: AQS-2983,82,81 FURNACE 1 RUN 3

TOTAL Metals

Lot-Sample #...: H2H150402-002 **Matrix.....:** AIR
Date Sampled...: 08/02/12 **Date Received..:** 08/14/12

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 2233100						
Lead	**39.5**	**1.0**	**ug**	**CFR60A 12**	**08/21-08/23/12**	**MV5EJ1AA**
		Dilution Factor: 1		Analysis Time..: 14:30	MDL.....: 0.35	

URS Corporation

Client Sample ID: AQS-2980,79,78,77 FURNACE 2 RUN 2

TOTAL Metals

Lot-Sample #...: H2H150402-003 Matrix.....: AIR
Date Sampled...: 08/01/12 Date Received..: 08/14/12

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 2233100						
Lead	92.9	1.0	ug	CFR60A 12	08/21-08/23/12	MV5EK1AA
		Dilution Factor: 1		Analysis Time..: 14:35	MDL.....: 0.35	

URS Corporation

Client Sample ID: AQS-2976,75,74,73 FURNACE 1 RUN 2

TOTAL Metals

Lot-Sample #...: H2H150402-004 Matrix.....: AIR
Date Sampled...: 08/01/12 Date Received..: 08/14/12

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 2233100						
Lead	96.3	1.0	ug	CFR60A 12	08/21-08/23/12	MV5EL1AA
		Dilution Factor: 1		Analysis Time..: 15:07	MDL.....: 0.35	

URS Corporation

Client Sample ID: AQS-2972,71,70,69 FURNACE 2 RUN 1

TOTAL Metals

Lot-Sample #...: H2H150402-005 Matrix.....: AIR
Date Sampled...: 07/31/12 Date Received..: 08/14/12

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 2233100						
Lead	92.6	1.0	ug	CFR60A 12	08/21-08/23/12	MV5EM1AA
		Dilution Factor: 1		Analysis Time..: 15:12	MDL.....: 0.35	

URS Corporation

Client Sample ID: AQS-2968,67,66 FURNACE 1 RUN 1

TOTAL Metals

Lot-Sample #...: H2H150402-006 **Matrix.....:** AIR
Date Sampled...: 07/31/12 **Date Received..:** 08/14/12

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 2233100						
Lead	83.0	1.0	ug	CFR60A 12	08/21-08/23/12	MV5EN1AA
		Dilution Factor: 1		Analysis Time..: 15:17	MDL.....: 0.35	

URS Corporation

Client Sample ID: AQS-2965,64,63 BLANK

TOTAL Metals

Lot-Sample #...: H2H150402-007 **Matrix.....:** AIR
Date Sampled...: 08/02/12 **Date Received..:** 08/14/12

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 2233100						
Lead	27.3	1.0	ug	CFR60A 12	08/21-08/23/12	MV5EP1AA
		Dilution Factor: 1		Analysis Time..: 15:22	MDL.....: 0.35	

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H2H150402 **Matrix.....:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: H2H200000-100 **Prep Batch #...:** 2233100						
Lead	ND	1.0	ug	CFR60A 12	08/21-08/23/12	MV7VM1AA
		Dilution Factor: 1				
		Analysis Time..: 13:56				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: H2H150402 Matrix.....: AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP-BATCH #
Lead	99	(80 - 120)			CFR60A 12	08/21-08/23/12	2233100
	104	(80 - 120)	4.4	(0-20)	CFR60A 12	08/21-08/23/12	2233100

Dilution Factor: 1 Analysis Time..: 14:01

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: H2H150402 **Matrix.....:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Lead	10.0	9.91	ug	99		CFR60A 12	08/21-08/23/12	2233100
	10.0	10.4	ug	104	4.4	CFR60A 12	08/21-08/23/12	2233100

Dilution Factor: 1 Analysis Time..: 14:01

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

TestAmerica Knoxville

ICP Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Thermo iCAP 6500 Duo ICP

Data File Name: F082312A.arc

Element	PDS MV5EKA	Original Sample MV5EK	Spike Added	Percent Recovery
Pb	5310.29	836.42	5000	89.5

Original Sample Result = 929.36 ug/L

Original Sample Result adjusted for PDS dilution = 929.36 ug/L x 9 mL / 10 mL = 836.42 ug/L

Spike Added = 50000 ug/L x 1 mL / 10 mL = 5000 ug/L

PDS Result = 5310.29 ug/L

PDS Recovery = [(5310.29 ug/L – 836.42 ug/L) / 5000 ug/L] x 100 = 89.48%

TestAmerica Knoxville

ICP Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Thermo iCAP 6500 Duo ICP

Data File Name: F082312A.arc

Element	PDSD MV5EKA	Original Sample MV5EK	Spike Added	Percent Recovery
Pb	5380.76	836.42	5000	90.9

Original Sample Result = 929.36 ug/L

Original Sample Result adjusted for PDS dilution = 929.36 ug/L x 9 mL / 10 mL = 836.42 ug/L

Spike Added = 50000 ug/L x 1 mL / 10 mL = 5000 ug/L

PDS Result = 5380.76 ug/L

PDS Recovery = [(5380.76 ug/L – 836.42 ug/L) / 5000 ug/L] x 100 = 90.88%

Sample Receipt Documentation

URS

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Reference COC No.: 8/14/2012

Project Name: Battery Recycling Company
Project Number: 39400681.00001
URS Sample Team: TG, MM, RR

Project Manager: Todd Gregg

Sample Shipment Date: August 14, 2012
Laboratory Destination: Test America
Laboratory Contact: Kevin woodcock
Project Contact/Phone: 865-291-3082
Carrier Waybill No.: N/A

Bill To: URS Corporation
1093 Commerce Park Drive
Suite 100
Oak Ridge , Tenn
37830

Report To: Todd Gregg
URS Corporation
865-220-8101
todd.gregg@urs.com

Sample Number	Sample Type	Date Collected	# of Containers	Sample Matrix	Requested Testing Program	Special Instructions
AQS-2987	Furnace # 2 Run # 3	08/02/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2986	Furnace # 2 Run # 3	08/02/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2985	Furnace # 2 Run # 3	08/02/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2984	Furnace # 2 Run # 3	08/02/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2983	Furnace # 1 Run # 3	08/02/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2982	Furnace # 1 Run # 3	08/02/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2981	Furnace # 1 Run # 3	08/02/12	1 of 1	Impinger Catch	USEPA Method 12 Inorganic Lead	

TURNAROUND TIME REQUIRED Normal: X Rush:

POSSIBLE HAZARD IDENTIFICATION:
Nonhazard: X
Highly Toxic:
Flammable:
Radiological:

Level of QC Required: I. X
II.

SAMPLE DISPOSAL: Return to Client: Disposal By Lab: X

1. Relinquished by: Signature/Affiliation: Todd Gregg	Date: 8/14/2012 Time: 3:55	1. Received by Signature/Affiliation:	Date: 8/14/2012 Time: 1554
2. Relinquished by Signature/Affiliation:	Date: Time:	2. Received by Signature/Affiliation:	Date: Time:
3. Relinquished by Signature/Affiliation:	Date: Time:	3. Received by Signature/Affiliation:	Date: Time:

Comments:

URS

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Reference COC No.: 8/14/2012

Project Name: **Battery Recycling Company**
Project Number: **39400681.00001**

Sample Shipment Date: **August 14, 2012**
Laboratory Destination: **Test America**

Sample Number	Sample Type	Date Collected	# of Containers	Sample Matrix	Requested Testing Program	Special Instructions
AQS-2980	Furnace # 2 Run # 2	08/01/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2979	Furnace # 2 Run # 2	08/01/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2978	Furnace # 2 Run # 2	08/01/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2977	Furnace # 2 Run # 2	08/01/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2976	Furnace # 1 Run # 2	08/01/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2975	Furnace # 1 Run # 2	08/01/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2974	Furnace # 1 Run # 2	08/01/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2973	Furnace # 1 Run # 2	08/01/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2972	Furnace # 2 Run # 1	07/31/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2971	Furnace # 2 Run # 1	07/31/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2970	Furnace # 2 Run # 1	07/31/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2969	Furnace # 2 Run # 1	07/31/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2968	Furnace # 1 Run # 1	07/31/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2967	Furnace # 1 Run # 1	07/31/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2966	Furnace # 1 Run # 1	07/31/12	1 of 1	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2965	Blank	08/02/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2964	Blank	08/02/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2963	Blank	08/02/12	1 of 1	Impinger Catch	USEPA Method 12 Inorganic Lead	

URS

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

1-H21H150402

Reference COC No.: 8/14/2012

Page 1 of 2

Project Name: Battery Recycling Company
Project Number: 39400681.00001
URS Sample Team: TG, MM, RR

Project Manager: Todd Gregg

Sample Shipment Date: August 14, 2012
Laboratory Destination: Test America
Laboratory Contact: Kevin woodcock
Project Contact/Phone: 865-291-3082
Carrier Waybill No.: N/A

Bill To: URS Corporation
1093 Commerce Park Drive
Suite 100
Oak Ridge , Tenn
37830

Report To: Todd Gregg
URS Corporation
865-220-8101
todd.gregg@urs.com

Sample Number	Sample Type	Date Collected	# of Containers	Sample Matrix	Requested Testing Program	Special Instructions
AQS-2987	Furnace # 2 Run # 3	08/02/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2986	Furnace # 2 Run # 3	08/02/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	HAND DELIVERED
AQS-2985	Furnace # 2 Run # 3	08/02/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	NO CUSTODY SEALS
AQS-2984	Furnace # 2 Run # 3	08/02/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	RECEIVED AT AMBIENT TEMP BKD 8-14-12
AQS-2983	Furnace # 1 Run # 3	08/02/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2982	Furnace # 1 Run # 3	08/02/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2981	Furnace # 1 Run # 3	08/02/12	1 of 1	Impinger Catch	USEPA Method 12 Inorganic Lead	

TURNAROUND TIME REQUIRED Normal: X Rush:

POSSIBLE HAZARD IDENTIFICATION:
Nonhazard: X
Highly Toxic:
Flammable:
Radiological:

Level of QC Required: I. X
II.

SAMPLE DISPOSAL: Return to Client Disposal By Lab X

1. Relinquished by: Signature/Affiliation: Todd Gregg	Date: 8/14/2012 Time: 3:55	1. Received by Signature/Affiliation:	Date: 8/14/2012 Time: 1559
2. Relinquished by Signature/Affiliation:	Date: Time:	2. Received by Signature/Affiliation:	Date: Time:
3. Relinquished by Signature/Affiliation:	Date: Time:	3. Received by Signature/Affiliation:	Date: Time:

Comments:

H21H50402

URS

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Reference COC No.: 8/14/2012

Project Name: Battery Recycling Company
Project Number: 39400681.00001
Sample Shipment Date: August 14, 2012
Laboratory Destination: Test America

Sample Number	Sample Type	Date Collected	# of Containers	Sample Matrix	Requested Testing Program	Special Instructions
AQS-2980	Furnace # 2 Run # 2	08/01/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2979	Furnace # 2 Run # 2	08/01/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2978	Furnace # 2 Run # 2	08/01/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2977	Furnace # 2 Run # 2	08/01/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2976	Furnace # 1 Run # 2	08/01/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2975	Furnace # 1 Run # 2	08/01/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2974	Furnace # 1 Run # 2	08/01/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2973	Furnace # 1 Run # 2	08/01/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2972	Furnace # 2 Run # 1	07/31/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2971	Furnace # 2 Run # 1	07/31/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2970	Furnace # 2 Run # 1	07/31/12	1 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2969	Furnace # 2 Run # 1	07/31/12	2 of 2	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2968	Furnace # 1 Run # 1	07/31/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2967	Furnace # 1 Run # 1	07/31/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2966	Furnace # 1 Run # 1	07/31/12	1 of 1	Impinger Catch	USEPA Method 12 Inorganic Lead	
AQS-2965	Blank	08/02/12	1 of 1	filter	USEPA Method 12 Inorganic Lead	
AQS-2964	Blank	08/02/12	1 of 1	PNR	USEPA Method 12 Inorganic Lead	
AQS-2963	Blank	08/02/12	1 of 1	Impinger Catch	USEPA Method 12 Inorganic Lead	

TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Lot Number: H21H50402

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ 1a Do not match COC ☐ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☐ 1g Other:	HA, HAND DELIVERED
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C)			✓	☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____ ☐ 2c Cooling initiated for recently collected samples, ice present.	
3. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?	✓			☐ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?		✓		☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?		✓		☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For 1613B water samples is pH<9?			✓	If no, was pH adjusted to pH 7 - 9 with sulfuric acid? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?	✓			☐ 19a Other	

Quote #: 81990 PM Instructions: _____

Sample Receiving Associate: _____ Date: 8-14-12

QA026R23.doc, 022812